FLIGHT

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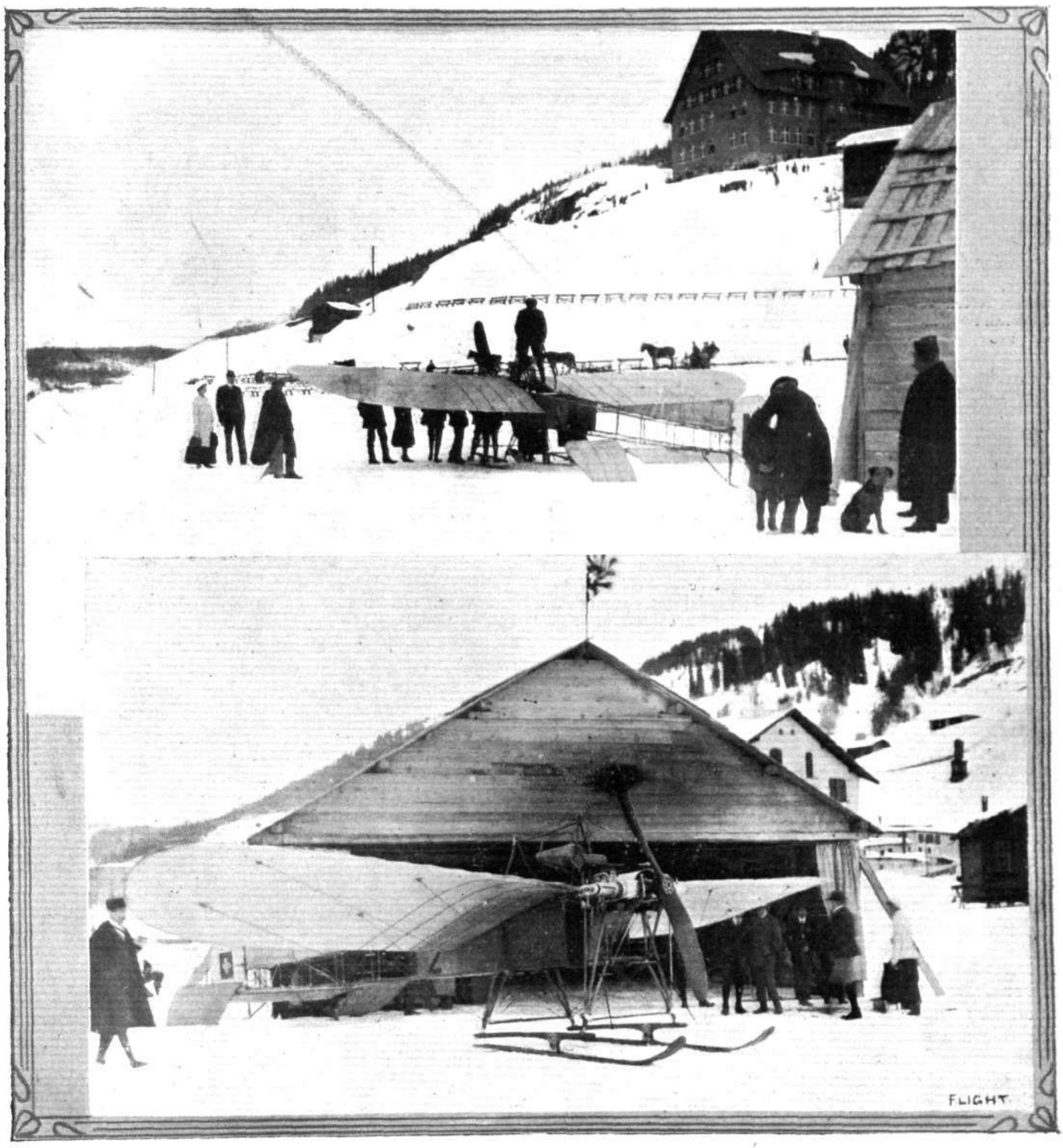


AVIATION AT DAVOS PLATZ.—The first aviator to fly a monoplane at Davos Platz is M. Grandjean, our photograph showing the machine and its shed at this famous resort. Moreover, M. Grandjean has entirely put the machine together on the spot by himself. Note the special skis attached for landing purposes. B 2

EDITORIAL COMMENT.

Military Aeroplanes and *Vanity Fair*.

Our contemporary *Vanity Fair*—is very angry with us, in a gentlemanly way, for having had the audacity to pass the opinion that any similar scheme to that of *L'Auto* in France, for the provision by public subscription of a force of "County" aeroplanes for Imperial use, would prove, at the present juncture, impracticable and even undesirable. Apparently—though we really had not heard about it when we wrote the article which is called in question—*Vanity Fair* has taken up the idea and is now in process of beating the big drum with the view of drawing attention to its own adoption of the French idea and its adaptation to the necessities of our own country.

Passing over the references to "pedantry," which seems to be the only serious offence with which we are charged because we failed and still fail to believe that an expansive territorial scheme of privately-purchased machines is what is needed at the moment, we come to the essence of our contemporary's proposal for the adoption of the French idea. Let us give it in *Vanity Fair's* own words:

"This scheme—for which we claim no originality, which is *L'Auto's*, and only such credit as our professional contemporary has graciously accorded *L'Auto*—has, we may say, been conceived and undertaken by us simply and solely to relieve the immediate situation, if possible, for the country, for the Army, and—a long way after, for the aero-industry. This last, we thought, might thus be given some firm if not very extensive basis; as a stepping-stone perhaps to the economical and efficient fulfilment of future War Office trials, and—orders; to say nothing of the manifold developments of flight and its popularisation in civil life. For these reasons—not to discover too much at the moment of a very comprehensive scheme—we made the special proviso that all machines ordered and purchased by the Selection Committee—for which nobody in the trade should be eligible—should conform in all respects to the advertised requirements of the forthcoming War Office trials, as far as possible. Secondly, in order to secure the best machines for the country and for the sake of British industry, we made it a condition that all machines should be built in the United Kingdom by and of British labour and material throughout, no matter whence the design came. Thirdly, because we believe that decentralisation never spelt efficiency more clearly than in military aviation—while placing the results absolutely at the disposal of the War Office, we suggested that the machines subscribed for by each county might be kept as near as possible to each county's regimental or Territorial depôt, provided that suitable natural facilities for flight practice existed in that district."

There are three long articles in as many issues of our contemporary, all devoted to the argument that it is absolutely essential that Great Britain should at once put her aerial house in order—with which we cordially agree, and have been preaching that same doctrine for longer than we care to remember. And then we come to the scheme itself, which is substantially that outlined in the paragraph we have quoted.

Let us begin by saying that we are not in any way opposed to the idea of this system of Territorial aerial defence. On the contrary, we welcome it now that it has been launched and will give it all the support we possibly can, consistently with the much more essential policy of urging upon the Government the crying need that exists for a forward move in aviation on the part of the War Office and the Admiralty, as the country can do with all the aeroplanes she can get hold of at the present time. We are against nothing at all that promises to help in the smallest degree towards the creation of a real system of aerial defence, no matter whether its genesis lie with private enterprise or with the State, by which for the purposes of this argument we mean the Government. Having thus clearly expressed ourselves, it now becomes our duty to endeavour to clear ourselves of the charge of pedantry allied with the implication of want of proper patriotic feeling which our contemporary prefers against us.

In commenting upon the French scheme, we said that in our opinion any similar movement in this country would savour of charity to the State, or at least an attempt to achieve out of the private resources of the citizens what the Government has failed to do out of the public funds. That is the basis upon which the charge of pedantry is levelled against us. Now, we hold still to the opinion expressed in those lines. In order to drive home the charge, *Vanity Fair* asks if it is wrong for people to subscribe to hospitals or to the building of Y.M.C.A. palaces or for the Salvation Army to establish farm colonies. Certainly not. But what connection have any of these things with the constitution of a properly correlated system of national defence, which is first and last the business of the Government, so far as its actual carrying out is concerned? Let us take a much more apt illustration than any of our contemporary's posers. Supposing one of our possible rivals adopts a new field-gun, which is streets ahead of the weapon which arms our own artillery. What happens is that through Parliament and the Press our War Office is urged to come into line and, supposing the case to be really serious and public opinion to be thoroughly awakened to its seriousness, the Government yields to the pressure and we get our new gun. But whatever we do, we most certainly do not beat the drum around the country and beg for subscriptions so that we may buy guns to relieve the Government from its responsibilities. But the Government having awakened to a due sense of what is necessary and having re-armed our artillery, there is then no objection in the wide world to private enterprise supplementing the efforts of the State by the purchase of guns for the use of local forces. If we were once to admit the principle that it is good for the private citizen to shoulder as an individual the responsibility which lies upon the State as represented by the Government, then there is an end at once of all necessity for departmental administration of the country's affairs, and, in matters military, we should soon get back to the days of feudalism and the trained bands.

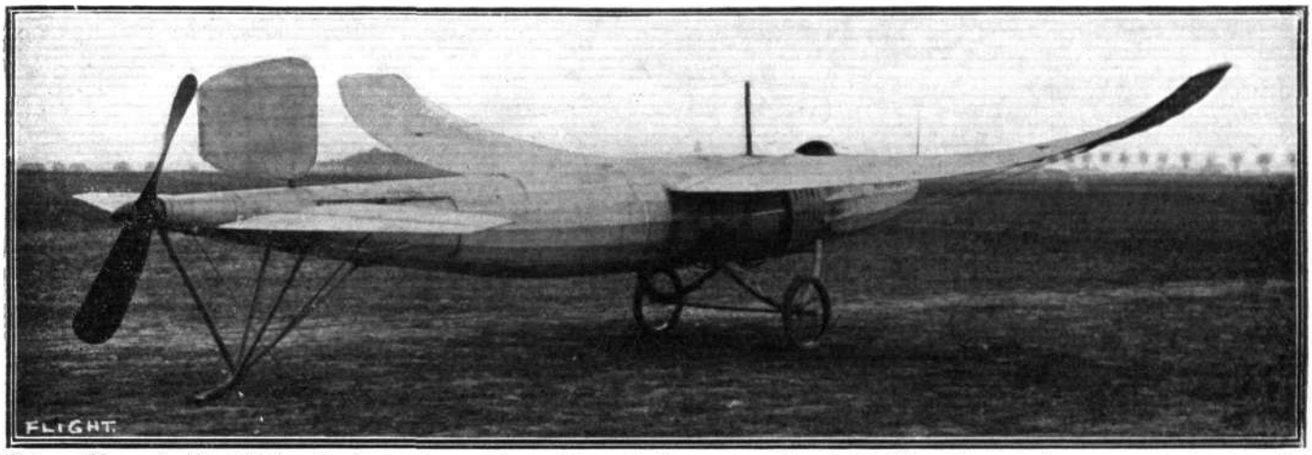
Patriotism is a very excellent thing—we trust we ourselves are as patriotic as those who proclaim their patriotism from the house-tops—but there is no sentiment which is more apt to run away with its professors, and, with all respect to *Vanity Fair* and its able contributor, we fear that something of the sort is happening in its case. Our view of the military aviation situation is that every journal in the country would deserve well of the nation if it made common accord with its contemporaries in the educating of public opinion up to the point when the Government dare no longer disregard the demand that our aerial forces should be put upon a sound and satisfactory basis. That having been achieved and the work well begun, by all means let us hear about schemes for supplementing our regular forces. But until then we still do not think the time is ripe for private enterprise to come in. It is simply putting the cart before the horse—which is not good.

THE PAULHAN-TATIN AERO-TORPEDO.

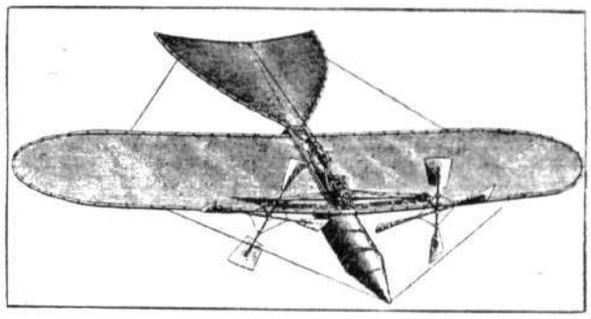
IT is a universally recognised fact that, among the various machines that have come to light during the past year, none can lay claim to a greater measure of real sound originality than can the Aero-Torpedo of M. Victor Tatin. Throughout the whole machine there is an atmosphere indicating the extent of painstaking thought that must have been devoted to the development of each individual part and to the embodiment in sound constructional form of those purely aero-dynamical *desiderata* which up to the present constructors have avoided in view of the complications involved. Having faith in his convictions and ignoring the comments of "Freak," which greeted his enterprise when the rough details of the new machine he was constructing leaked out for the first time, he has proceeded with his experiments and produced a machine, which, by virtue of its excellent performances and extreme novelty, was the centre of interest at the last Paris Salon. Although the machine expresses so many novel ideas in aeroplane design, it is nevertheless a fact that its whole conception, excepting as regards the arrangement of the propeller, was established in the brain of M. Tatin as long ago as 33 years.

The most notable feature that becomes evident on first inspection is that, opposed to conventional monoplane practice the propeller, such in the true sense of the word, is arranged at the extreme rear end of the torpedo shaped body, where driven by a shaft some 20 ft. long, it revolves in the region of air disturbance that follows the passage of the machine and is so enabled to work with greater efficiency. The notion of placing the propeller at the rear occurred to Tatin something like twenty years since.

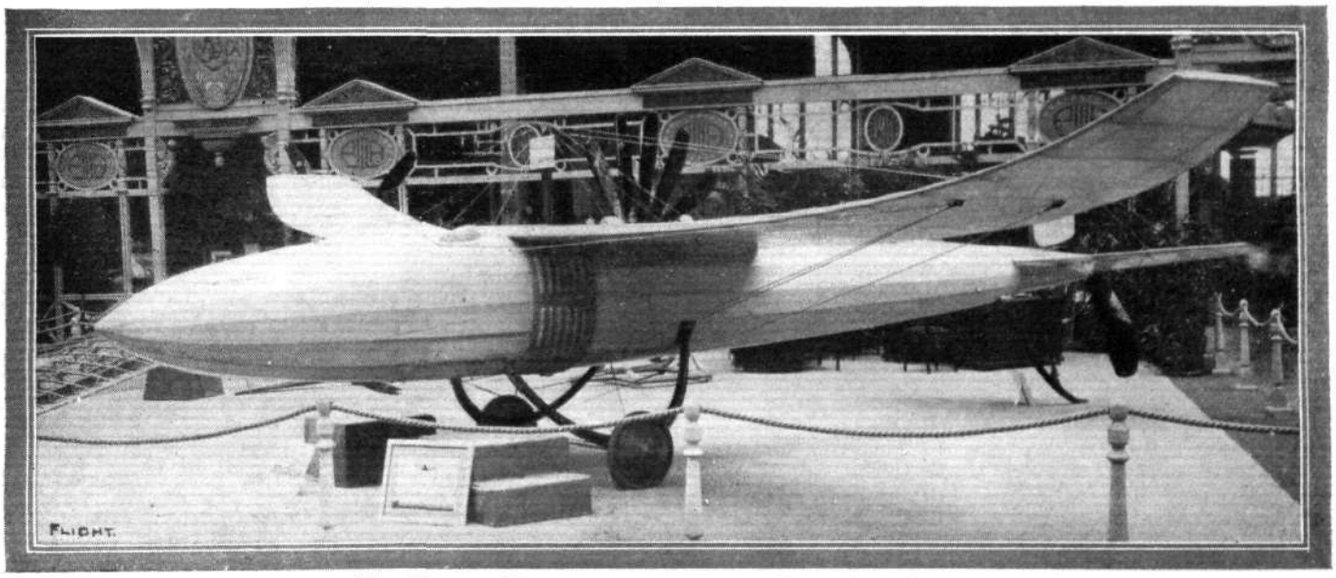
Apart from the number of craft of the genus *canard* in which this arrangement of the propeller is much more easily attainable, some few attempts have been made to effect this disposition in the past in connection with monoplane design, but as these experiments were in every case soon abandoned, it may be assumed that to Tatin belongs the credit of being the first to obtain any measure of success with this system. In England the enterprising Petre Brothers exhibited a monoplane incorporating this feature at the Olympia Aero Show in 1910, but the tests which followed had to be brought to a conclusion in view of the difficulties in the way of its successful application. At about the same time another monoplane of the *canard* type, but



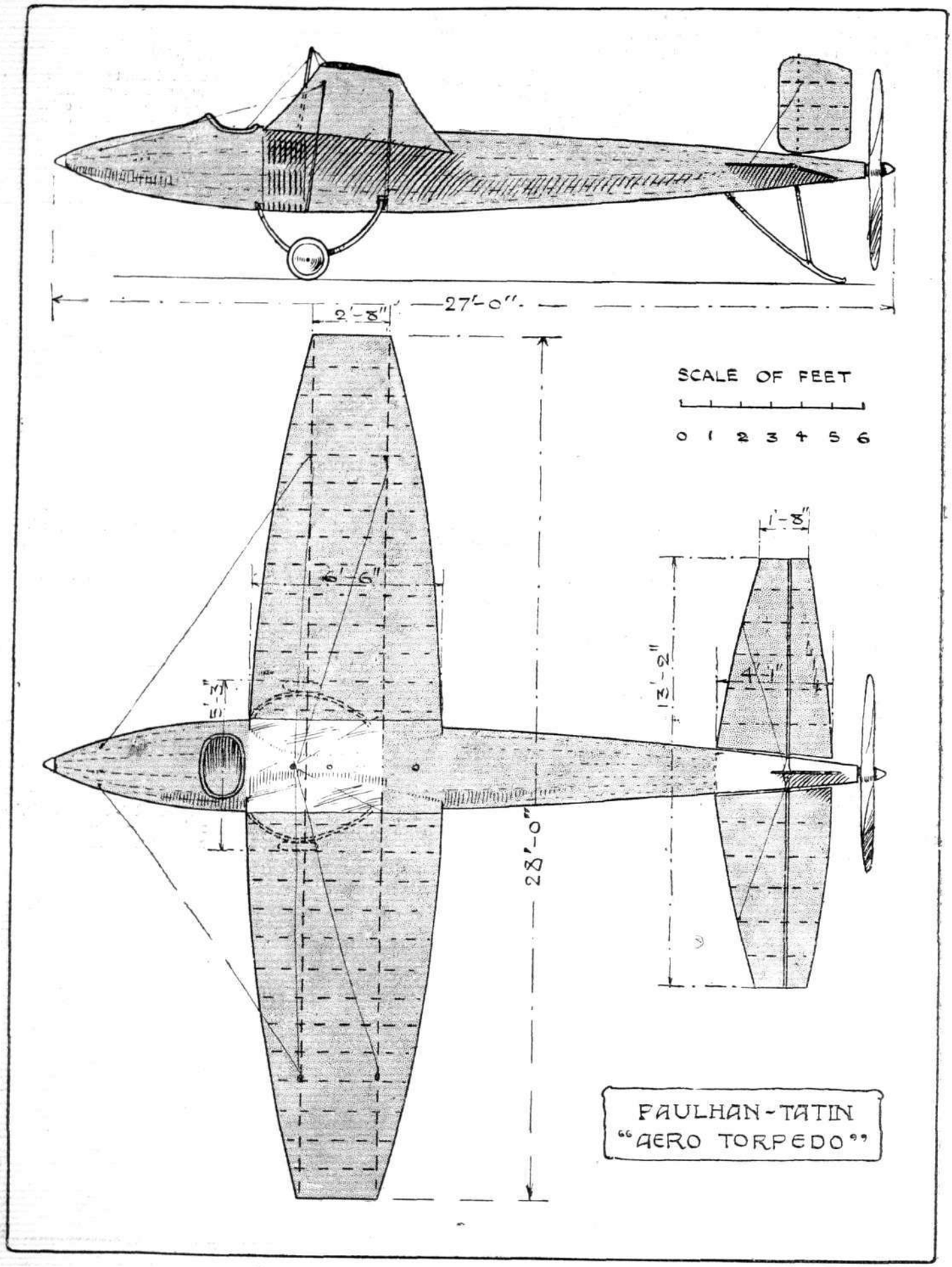
"Aero Torpedo No. 1," the first experimental machine of this type, with which 88 miles per hour was obtained, with Gaudart at the lever.



THE FORERUNNER OF THE "AERO-TORPEDO."—The model, driven by compressed air, with which Tatin experimented at Chalais-Meudon in 1879.



The Paulhan-Tatin monoplane at the Paris Aero Show.



THE PAULHAN-TATIN MONOPLANE.—Plan and elevation to scale.

with its propeller shaft driven from the engine, situated in front of the pilot, made its appearance in France. Curiously enough it was the result of M. Armand Deperdussin's entrance into the arena of aeroplane construction, and in its production he had collaborated with M. Feure. For some time this machine was exhibited, suspended in the Central Hall of the famous Louvre Stores in Paris. Little was heard of its subsequent tests, and M. Deperdussin sought another solution to the problem of producing a successful and efficient monoplane. That he has succeeded in doing so is borne out by the popularity his machines at present enjoy.

First and foremost, in the design of the Aero-Torpedo, has been the aim to achieve efficiency by suppressing to as great an extent as possible, those individual parts of the machine which present resistance to forward advance and so absorb power without turning it to any practical advantage. The body itself, covered throughout its whole length by fabric is as near true stream-line form as can conveniently be obtained, and in its interior is mounted the engine, a Gnome, of 50 h.p. The pilot himself is seated so low in the body that only his head emerges.

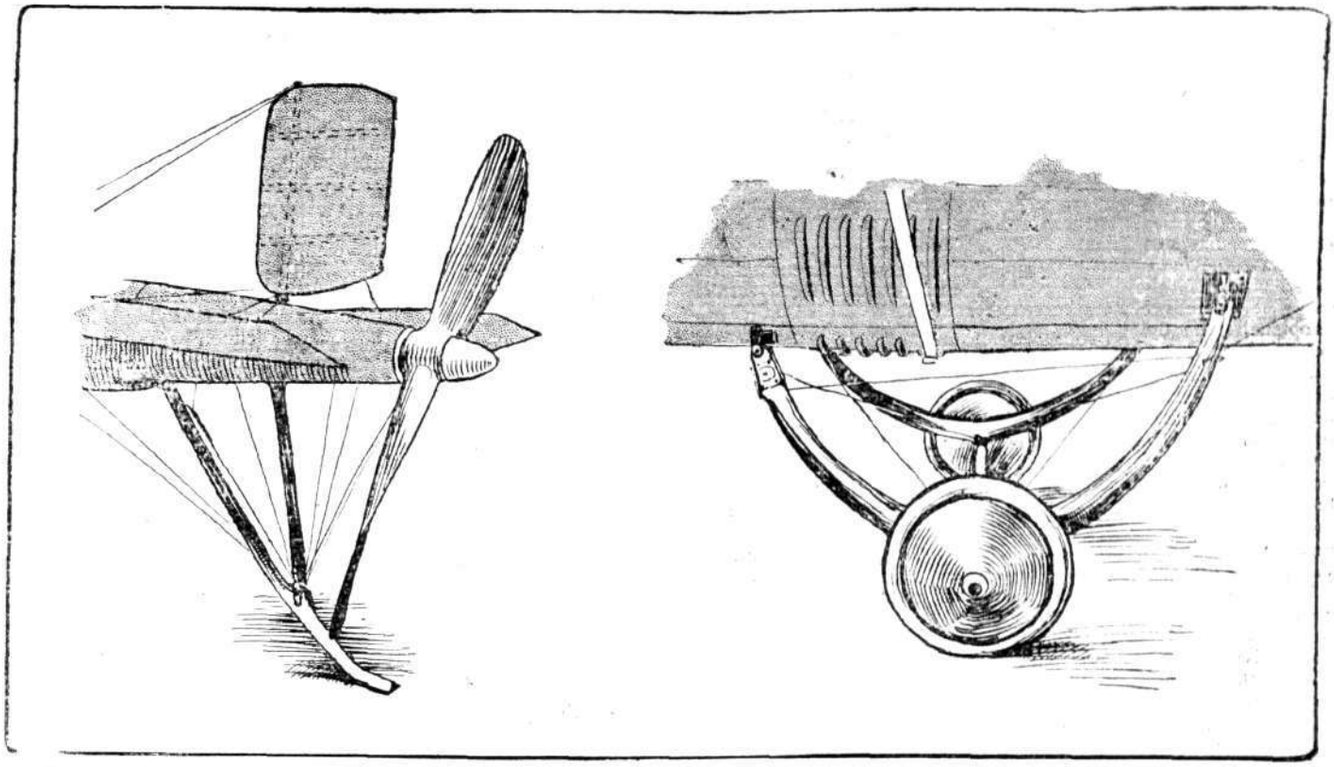
An effort has been made to arrange as many organs as possible, which, in other machines present head resistance, in the interior of the *fuselage*. Thus the shock absorbing section of the landing chassis is disposed inside and the bottom *pylone* from which on most other machines the warping wires are taken, has been suppressed. What little warp is provided is operated by flat steel bands proceeding from the base of the body.

Everything exterior to the body has been most carefully shaped to stream-line form. The chassis itself, while being extraordinarily strong is extremely simple, and sections of it in the plane of flight are in every case very approximating to stream-line. The spun steel discs applied to the landing wheels and the belled-out aluminium cone which effects the final "run-off" of the propeller boss are indicative of the care which has been devoted even to lesser details to avoid head resistance losses.

The fabric covering of the main body is supported on light wooden hoops which surround the body proper, a lattice girder of the customary type, rectangular in section. So well has the workmanship been carried out that tests at the Arts et Metiers Institution have revealed its great strength to resist both torsional and flexional strains. Proving so rigid in this respect the constructors have abandoned the pair of universal joints with which the propeller shaft on the first model was furnished, and have adopted a simple tube for the purpose of connecting engine with the propeller. In order to prevent any "whip" in the shaft, it is slung at intervals along its length by six ball-bearings, each of them being strung in position by steel wires. Immediately behind the pilot, who sits in advance of the wings is mounted the motor, and the fabric covering of the *fuselage* in its vicinity is substituted by a louvred metal shield. This is made detachable so that the accessibility of the engine may not be interfered with. While the idea of the engine being arranged inside the *fuselage* is a very excellent one, we have some misgivings that in the case of air-cooled engines, trouble through over-heating is likely to be experienced, even with those of the rotary variety. The bench tests to which every engine leaving the Gnome works are subjected, fully demonstrate the capacity of the motor to keep perfectly cool by virtue of its revolution in still air and independent of any relative cooling draught due to forward motion. But in this case it would be working under entirely different conditions, and being enclosed to such an extent, with such little provision for ventilation, it is to be feared that it would soon attain a temperature not consistent with its efficient operation. However, we are assured that up to the present the engine has run with every satisfaction. At any rate, as far as the pilot is concerned, its proximity can be reckoned upon to afford him some measure of creature comfort on long distance flights in cold weather, although perhaps, its nearness would not be so appreciated should a heavy nose-landing happen.

In plan form, the wings may be represented by an ellipse with its tips cut away by lines parallel to its minor axis. In front elevation they have the appearance of an ellipse which has been cut by a line parallel to and below the major axis. This special wing shape is held by the designer to endow considerable natural lateral stability, and so convinced is he of its effectiveness that little or no warping has been provided for. While these upturned tips would certainly give the required result in calm weather, it is doubtful whether they will prove a sufficient guarantee of stability in disturbed air. In cross section they exhibit very little curvature, and what small amount of curvature is present bears a certain resemblance to that of the Nieuport wing. Similarly their angle of incidence is extremely small. Two double flat steel ribbons on each side of the body alone support the weight of the central unit in flight, the rear ribbon also serving to operate the wing warping.

At the rear end of the main body is arranged the tail, an organ almost identical in plan form with the wings. A purely directional flat surface plays the part of stabilizer and behind it is hinged the elevator, a pair of simple flaps operated by a crank arranged in the interior of the body. Mounted vertically above this surface is the directional rudder, balanced and approximately rectangular in shape. At the extreme rear is the propeller, a Régy Frères of 8 ft. pitch, which is protected against contact with the ground by a high skid. We should imagine that, it being impossible to lower the tail any appreciable amount, some difficulty would be met with in getting the machine to leave the ground quickly on



DETAILS OF THE AERO-TORPEDO.—The sketch on the left shows the arrangement of the tail unit and propeller. On the right is the landing carriage, showing the disc wheels and the louvred metal shield surrounding the motor.

attempting a flight. Conversely, it seems as though the machine, especially as it is credited with such high speed as 88 miles per hour would require an enormous length of ground in which to come to rest after landing. To modify this we would favour the adoption of some form of braking device, for the chances of always finding large spaces to alight on are scarcely to be relied upon.

The landing chassis is, as we have already remarked, one of extreme strength and simplicity. The common axle uniting the two wheels is attached to two arcs of hickory, a most suitable wood to use. At their forward extremity these arcs are hinged to the *fuselage* and at their rear end they are united by a strong piece of wood, which, in its turn, is strapped by means of cotton-covered rubber cord to a reinforced cross member of the lattice girder body. The cross bracing of the chassis can scarcely be accused of offering a great deal of head resistance for, to impart rigidity only six wires, they really should be termed light rods, are used; these passing through the arcs and tightened, Valkyrie fashion, by means of nuts and lock nuts on the outside. In common with a great many other machines to-day, especially those of modern origin, no attempt has been made to provide for the accommodation for a bodily sideways movement of the machine on landing.

Constituting, as this machine really does, a decided advance in aeronautical design it will be interesting to notice what effect these many innovations will have on future practice.

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IMPRESSIONS AT THE PARIS AERO SHOW.

By DR. E. VALENTIN.

IT has everywhere been the claim of the motor car industry, says Dr. Valentin in the *Allgemeine Automobil Zeitung*, that applications of the high-speed internal combustion engine to other purposes fell within the sphere of its activity, and so among others that of aerial flight. Nevertheless, for some time the claim to this rapidly growing industry was disputed, on the one hand by the coach builder on the grounds that the wooden framework was the main object, the motor being but an accessory to be fitted by any mechanic, on the other hand by the shipbuilder owing to the (superficial) similarity between the two modes of propulsion.

Motor car engineers, however, view this struggle with equanimity, remembering but too well how, some ten or fifteen years ago, they themselves had been the subject of a similar contest between the locomotive works, the carriage builder, and the general engineering industry, which struggle was to result not in the success of one of the claimants, but in the rise of a new and entirely independent branch of the engineering industry.

In going the round of the Paris Show one could not but be struck by the fact that something very much similar is happening to the flying machine and its attendant industry. Already one can affirm with decision that the times are past when bamboo, twine, tintacks, and glue, were necessary ingredients in the construction of an aeroplane. The flying machine is passing through the stages of constructional development as the motor car did before it. In a construction based on the interchangeable system, where parts have sometimes to be replaced rapidly by accurately fitting spares, a material so unsuited for this sort of thing as wood is steadily being replaced by metals of various kinds. Indeed, those parts which are still made of wood are more and more designed as entirely separate from those of metal to enable them to be built in separate independent departments of the works. This shows that the construction of flying machines is tending to alter from the manufacture of single machines to that of series. And the requirements for military purposes will assist in emphasising the desirability of this step.

Though even at the late Show it was not possible to speak of *a standard type* or even types, and though the great diversity among the types of engine adopted was disappointing to a seeker after standardisation, yet the direction which the successful designer is to take in the near future was most clearly indicated. Just as early motor cars were wooden vehicles into which an engine had subsequently been built; and as this stage was passed by the wood and steel-plate (*i.e.* armoured) frame on the one hand, and the tubular construction on the other; all finally to be superseded by the pressed steel frame; so at the Show were to be found examples of construction of wood, armoured wood, steel tubes, and finally (though still few) of pressed steel.

Another conspicuous analogy is to be found in the place allotted to the power-plant. Many of the cars built at the end of last century had the driver's seat right in front, the engine being frequently at the opposite extremity. Only very slowly did the recognition come that the motor should be located in front of the driver under a separate, and easily removable cover, so as to facilitate inspection, cleaning, oiling, &c., but above all to enable the radiator to have the benefit of the most advantageous cooling position. And so in the aeroplane various positions have been tried; sometimes the pilot sat in front, the motor being immediately behind him; sometimes it was placed by his side, the drive to the propeller being by means of a chain; sometimes even it was placed over his head; at the Show, however, the majority of machines showed a similarity in construction in so far that the motor was in most cases situated in front between the propeller and the pilot.

Where so situated, the motor is protected by a bonnet which, however, does not impede the flow of air to the cylinders in the case of air-cooled engines. Where water-cooling has been adopted the opinions still seem to differ as to the most satisfactory situation for the radiator, but even here designers are beginning to acknowledge that the position adopted in motor-car design is on the whole the most satisfactory. Automobile engineers have already tried and rejected as unpractical the various dispositions, such as could still be seen at the Show, *e.g.* of employing long tubes running along the sides of the frame, or underneath the frame, or over the motor, &c.; even the spiral cooler shown by one firm was no novelty, as the Eisenach Car Works tested such a device some 9 years ago.

In two other important points the aeroplane builders are profiting by our experience, viz., in the use of a body to protect the pilot and passengers, and in the springing of the framework of the aeroplane itself. Hydraulic springs, rubber bands, spring wheels, &c., all have been tried and abandoned by the car designer and have had to yield to the laminated spring, and so it is with the aeroplane, for though it cannot be said that the springing of our motor cars is ideal, yet we know that all the various devices tried are inferior to the laminated spring inflexibility, simplicity, reliability and ever-readiness. With regard to the bodywork, advance in this was much *en evidence* at the Show the unprotected seat of the pilot and passenger having given way, as it has done on the car, to a carefully designed body whereby the head resistance may be diminished and eddy currents avoided, and in which proper upholstering has added much to the comfort of both pilot and passengers.

But there are further points which, it is evident, the aeroplane designer will have to copy from car practice, if flying is to become safer and more convenient. Thus a clutch will be interposed between the engine and the propeller to avoid the necessity of getting outside help in starting up, and to enable the propeller to be stopped without at the same time stopping the motor as has hitherto, of necessity, been the case. Then again, brakes will have to be applied, as has already been attempted, to enable a more rapid stop to be made in landing. The burnt gases will not (as has been the case so far) be allowed to escape into the atmosphere with the noise of a quick-firing gun, but will be silenced as on a car.

In short, the experience which the car builder has gained in the course of years, and at considerable expense, has to a great extent had, and will have to a still greater, a profound influence on the design of the aeroplane.

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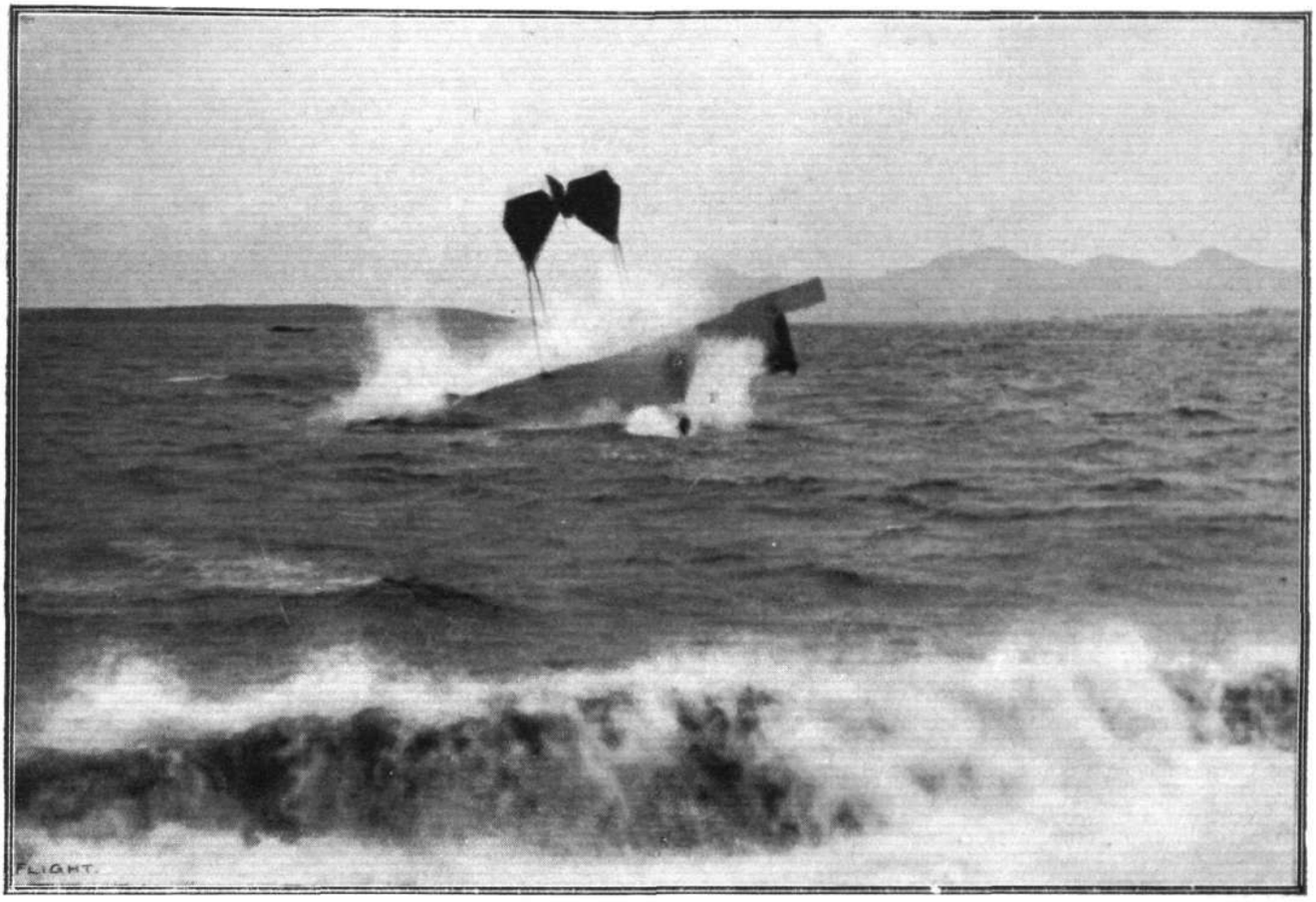
SOARING FLIGHT AND KITE FLYERS.

THE discussion on soaring flight at the Aeronautical Society, on Tuesday, January 30th, maintained the successful character of other recent meetings, and the Society was also fortunate in enlisting the support of such a prominent man as Sir John Wolfe-Barry, K.C.B., F.R.S., to take the chair in succession to Maj.-Gen. R. M. Ruck, C.B., and Sir George Darwin, K.C.B., F.R.S., who presided at the earlier meetings this session.

A variety of very interesting information was contributed to the discussion by the speakers, and it is still very evident that considerable diversity of opinion still exists as to the principles on which soaring flight is based. There is one matter that occurs to us in connection with this subject, which is that a considerable amount of useful data might be collected by means of kite flying. The Kite and Model Aeroplane Association might perhaps be willing to consider the possibility of collecting such evidence in the interests of science, and we would suggest that one of the most straightforward investigations that could be proceeded with at the present time is for kite flyers in all parts of the country to record what they know of the weather conditions in which they can possibly make their kites soar. Soaring on the part of a kite is accomplished when the kite itself flies at the end of a *vertical* string. It is necessary, of course, that the kite should be properly designed with as little head resistance as possible, in order that it may easily obtain sufficient propulsive force from the wind whenever the meteorological conditions satisfy the theoretical requirements for soaring flight. Lawrence Hargrave, it may be recalled, was one of the first to experiment in this way, and we believe that close study of this branch of the art would bring to light many interesting facts, especially if carried out over a wide zone, but under the ægis of a central organisation like the Kite and Model Aeroplane Association.



HYDRO-AEROPLANING AT NICE.—The start and the finish of one of Hugh Robinson's flights over the sea on a Curtiss "triad." Below is the machine on the beach ready for a demonstration, and above is a remarkable "snap" at the moment when it struck the water.

DISCUSSION ON SOARING FLIGHT AT THE AERONAUTICAL SOCIETY.

COL. J. D. FULLERTON, R.E. :—

Before discussing the theory suggested by Dr. Hankin, I may point out that it is, practically speaking, the same as one proposed by Mr. Albert Ross some fifteen years ago (see *Mean's Aeronautical Annual*, 1897, page 157). Writing in the *Marine News* he said: "The question is, do we now understand the properties of air? . . . It does not contradict the laws of thought to assume for the purposes of experiment that the constant action of the sunlight upon the air is such that when the air is agitated by the swift passage of the wing-bone a molecular action is caused in the air, which causes an expansion, and that expansion acting upon the rear feathers upward bent, gives a forward thrust."

1. I do not suppose that Dr. Hankin has ever even heard of Mr. Ross, but the extract is interesting as showing how two people, living many thousands of miles apart, sometimes hit upon the same idea, quite independently.

2. As regards the theory itself, two things have to be proved, viz., that "Ergaer" exists, and that the *air really was calm* at the time the soaring feats reported occurred.

3. I do not propose to say much about "Ergaer," as its existence or non-existence is clearly a matter for experiments, but I may here draw attention to the fact that hydrogen and chlorine explode when exposed to strong sunlight, and bearing this in mind, it is perhaps just as well not to condemn Dr. Hankin's theory too hastily.

4. Next, as regards the state of the air. The air may have been calm, but I am not quite convinced that it was so. The tests applied by Dr. Hankin do not seem to me quite satisfactory, as they were not delicate enough to detect small upward currents of from 2 ft. to 4 ft. per sec., at heights of from 100 ft. to 2,000 ft. above the level of the ground. Upward currents of this kind are amply sufficient to support the lightly loaded birds referred to, and consequently an examination of the tests is of great importance.

5. Before discussing them in detail I may point out that calm air is considered by meteorologists to be something of a "meteorological curiosity," and that the normal state of the air is one of motion, and very varied motion too. Velocities and directions, both vertical and horizontal, are constantly changing, and although calm air may of course exist, it does not seem likely that it would continue for the engthy periods covered by Dr. Hankin's observations.

6. Next as regards the tests applied by Dr. Hankin. These were observations on the strength of the wind about ground level; noting the rise of smoke from chimneys; watching feathers, &c., floating in the air; observing the formation of heat eddies and noting the effect of diminished sunshine on the soaring power of birds. No instrumental tests were made.

7. As regards the strength of the wind, the Beaufort scale states that a wind of five miles per hour (7⅓ ft. per sec.), is almost imperceptible to the sensations. I do not think it is possible, therefore, to judge the strength of currents of 2 ft. to 4 ft. per sec., in this manner, especially as the currents may have been stronger at soaring altitudes. The smoke tests from chimneys are also, I think, equally unreliable, as a vertical current of air could not be separated from the current due to the chimney gases. Floating feathers, &c., are also a very doubtful test; they must obviously have some weight and some definite falling velocity, and if they are supported in the air it seems natural to suppose that there is an equal upward velocity of the air supporting them. [N.B.—I have found by experiment that the small feathers from a pigeon's breast, weighing $\frac{1}{25}$ grain, fall at the rate of 1¼ ft. per sec.] As regards the upward turn of the outer feathers of the wings, when a seed or feather was motionless in the air, this upward turn is due more to the weight of the bird than anything else. The reason why this peculiar arrangement exists is, as pointed out by Dr. Cousin, to ensure the bird's stability; the feathers of non-soaring birds do not turn up in this way. Deductions drawn from watching heat eddies seem to me of very doubtful value; delicate instrumental tests are essential if any reliable information is to be obtained. As regards the reduction of the amount of sunshine causing the birds to stop soaring, it is only fair to point out that clouds coming across the sky would reduce the strength of the small upward currents, and that alone would cause the birds to change their mode of flight.

8. But quite independently of the tests, I think the geographical and climatological conditions of Agra and Naini Tal are opposed to the likelihood of still air for any length of time. Agra lies almost in the centre of an enormous plain, sheltered on the north by mountains from 1,500 to 20,000 ft. high, in a country where the average yearly temperature is about 80° F. In January the mean minimum temperature is 42° in the early morning, while the mean maximum temperature is about 73° at 3 p.m. Similar conditions occur in July, but the daily mean range is from 77° to 93°. The mean horizontal wind velocity in January at 8 a.m. is from 2 to 5 miles per hour; the mean July wind at the same time is from 5 to 10 miles per hour. As regards Naini Tal, the village lies in a sort of cup; the level of the lake is 6,350 ft., and it is surrounded within a mile and often much less, by hills from 1,000 ft. to 1,500 ft. higher. The temperature is not, of course, as high as that of Agra, but in January there is a diurnal range of 16°, while in July the rise is over 9°. It seems to me that both these places favour strongly the formation of small, steady, upward currents, and I think it very doubtful whether the air there is ever calm for any long periods.

9. On the whole I am inclined to think that soaring is due to small, steady, upward currents. The bird apparently flaps himself up in the air until he comes to a stratum where there is a current having an upward velocity equal to his downward vertical gliding velocity, and he can then, by suitably inclining his wings, soar as long as the particular conditions last.

MR. MERVYN O'GORMAN :—

Owing to the lesser size of birds—even the largest—it is not proper to consider that their soaring is necessarily dependent on identically the same conditions as that of aeroplanes and gliders of man-lifting size. Small models may yet be made which will soar as birds do if they can be indued with certain organs which may for present purposes be called organs of sensitiveness.

In the two opening speeches made at the last Aeronautical Society's meeting on the 30th ult., Mr. Berriman and Dr. Hankin respectively considered two different aspects of soaring, and it is possible that the size of the aeroplane and bird respectively occupying the mind of each explained their divergence of view, if we add to the bird a supposed sensitiveness to small movements of air which will be suggested herein. It is agreed that the old conception of the air chiefly as a horizontally moving fluid, though useful to sailors and go-by-the-grounds, is too narrow; and we now admit the existence, if not the predominance, of vertical currents which are clearly the cause of the horizontal ones. This conception, though broadly correct, is in detail insufficient, and we have been compelled to move forward yet another step by flying in aeroplanes, for we admit that the up, down, and cross movements are very local, as well as broad and general—one wing may receive air having one velocity and direction while the other wing receives another, during a time when the air as a whole is moving with a general trend from say west to east, or alternatively, while the air as a whole is so calm that no instrument or sensation of one detects a draught at or near the ground. In the case of flight near the ground we detect the causes of these *remous*—a pond, a patch of grass, houses, a chimney, a shed, hot sand, the shadow of a hill, &c.

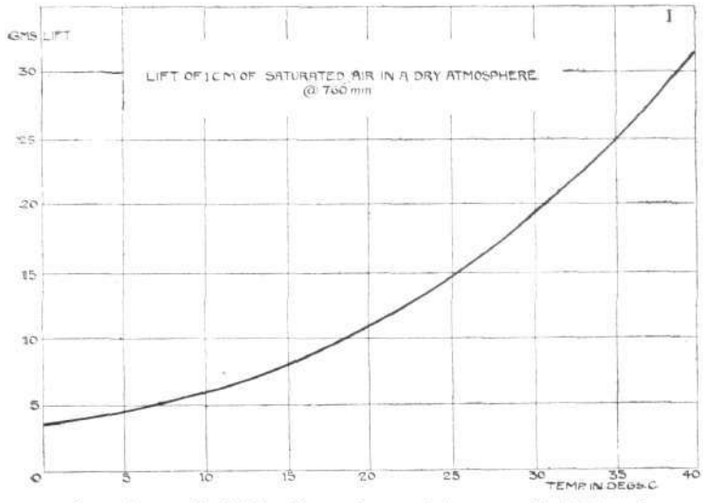
Dr. Hankin, as the maker of most studious observations on birds, is best entitled to frame the theory which seems to him to meet and explain the observed facts; and I have no data to compare with his. He finds that while a feather falling away from a bird's body drops towards the ground, on a day which is only to be described as perfectly calm, the bird itself circles and soars without flapping. Moreover, he obtains a general conclusion, that soaring occurs best, though I gather not exclusively, in sunlight.

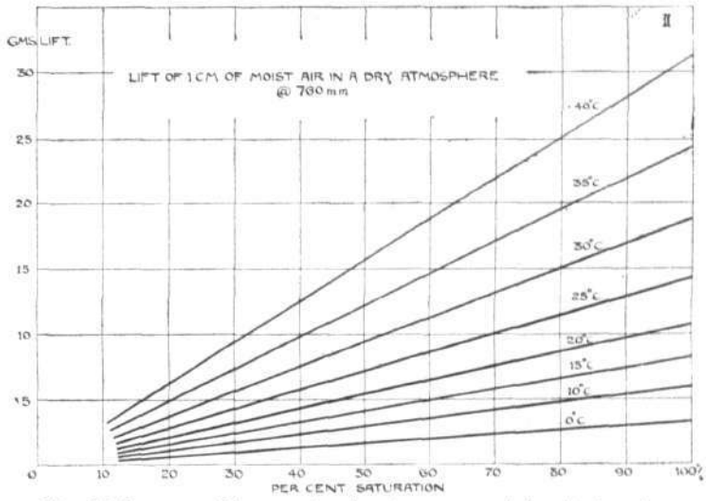
The effects of sun on the air, and on the ground which will in turn affect the air to be considered, and the possibility of the air being non-homogeneous, is to be particularly looked for. Air which has at some time risen from, or passed over, the ground, is liable to be irregularly moist, and just as the clouds have irregular shapes, so the invisible water vapour may be expected to occur in nodules, and streaks of varying form. The amount of invisible moisture is also liable to be irregular even within a moist patch, according to the amount of delay allowed it by the wind over wet grass, trees, rivers, sand, &c., and the temperature of those sources at which it gathered its moisture.

At any plane vertical section of the atmosphere which is thus blotchy with damper places there is irregular air movement for an important reason, even if the temperature of the entire section were uniform. Fig. 1 gives a curve, plotted for me by Mr. W. C. Claypole, indicating the amount of *lift* obtainable by a weightless balloon enclosing one cubic meter of really wet air floating in a dry atmosphere. This shows that as the general temperature gets warmer the wet air gets more buoyancy. This buoyancy or lift is the measure of the force available to give an upward acceleration to a body of wet air occupying a cubic meter. The force is small, and not enough to support a bird, but the velocity attained would be fairly great after the lapse of a few minutes, and thereafter we are concerned with the "dynamic" support of the bird moving through an upward current, and this is a difficult consideration, as everyone concerned with constructing an aeroplane and a gyropter can tell.

Still, in an irregularly moist atmosphere of uniform temperature, we cannot have anything like such rapid movements as are to be expected when the same air is irregularly warm. Hence the link between sunshine and soaring would appear to be far stronger than the sentimental one based on the extra cheerfulness of the bird. The direct rays of the sun have an extraordinarily small effect in warming dry air, but what is important now is that we have suddenly become concerned with relative heat absorption of various parts of the air, and we find useful information in the ordinary facts of physics relating to this subject. To begin with, the majority of the sun's radiant energy is translated into dark heat on its reaching the earth, and much of this is radiated therefrom into space, to be intercepted by any available good absorbers. Experiments made by Faraday (who seems to have done everything) and others show that air which is only partially moist—like the breatheable air in a room (contains only 42 per cent. of the moisture required for saturation), absorbs radiant heat 72 times as much as dry air. It is unnecessary to say that this increase of absorptive power will very noticeably increase its temperature, thence its volume, and thence its rate of rising.

Let us only consider a small lump on a nodule of moist air suspended and isolated at a high level above the earth. It will not be uniformly warmed, and even if it were, experiments on superposing a layer of cold liquid on a layer of the same liquid hot, have shown that the hot liquid does not rise as a lump, like a cork, but in streaks, which curl as they rise. Accordingly we may safely anticipate for the rising nodule a curly, irregular surface, breaking into streaks of upwardly moving air, immersed in a sea of, according to the first supposition, perfectly still air, or, according to the second assumption, air which is only moving here and there vertically according as it was more moist than the surrounding matrix. In addition to this, there is the irregularity due to the various degrees of saturation existing in the nodule. To illustrate this I give Fig. 2, which shows the extra lift at any temperature of a cubic meter of air containing all percentages of moisture up to saturation.





If we suppose a bird to be gliding in this irregular fluid, and to have such sensitiveness in his bill, head, or leading edge feathers as to detect the presence and shape of the waves about him, we have, in a manner which has been so frequently explained that it need not here be repeated the necessary conditions of soaring. Mr. Berriman indicated it in his Fig. 11, where a bird skims along near the surface of the sea, passing from the plain air into a dead water of eddies behind the crest of a wave, and being supported without flapping by a clever trick of altering the incidence, and, doubtless, the curvature of his wings at each change in the quality of the air he enters.

While on this subject it is interesting to remember the existence of other causes for portions of air becoming more buoyant locally in the sunshine, whether or not the general atmosphere is calmer, or in spite of the general atmosphere having either a downward or upward trend. Thus there are interesting facts known about other volatile substances, and other gases. Ozone, for example, has 136 times the heat absorption of dry air. Perfume-laden air is given as having many times the heat absorption of air.

Thus patchouli, otto of roses, lavender, thyme, rosemary, cassia, are credited respectively with increasing the heat absortion by 31, 37, 60, 68, 74 and 109 times respectively. Aniseed, as an extreme case, has the remarkable quality of causing the absorption of 370 times the amount of heat of dry air. Mixtures probably behave differently, but I have no data. Enough has been said to suggest further and different causes for irregular local ascending currents. To each of these ascending currents there corresponds some downward movement and some horizontal movement cross connecting the up and down streams, and the whole moving system is doubtless a mesh of curly moving items of air.

How the bird becomes conscious of these "curlies" can only be surmised; he may smell the perfumes, and even the dampness; he may be capable of feeling the change of acceleration of the air movements as he enters upon their outskirts, and so of anticipating whether the particular curly he is next about to enter upon is rapid or slow, large or small, helpful or useless; or whether it is one that calls for increasing the angle of attack or decreasing it.

The chief matter of interest in the above suppositions is that, in accordance with Dr. Hankin's interesting observations, the "curlies" will be brought into being by the sun, partly by the direct heat, but mostly by the dark radiant heat after the conversion has been effected by falling upon the earth, or upon dust particles in the air. The occurrence is quite compatible with the most perfect apparent stillness of the atmosphere, and with the fact that a feather a few inches from a soaring bird might be travelling downwards in one side of a "curly" while the bird soared with the help of the top side, or the rising side.

The continuance of the phenomenon depends upon the air failing to become homogenous through mixing and diffusion in the span of time during which soaring lasts. There is one physical phenomenon which may assist in this also, namely, that the viscosity of air increases with the temperature (unlike what occurs in most liquids). This increase in the viscosity of the warmer air will tend to make it hold together a little more, *i.e.*, to become streaky instead of becoming rapidly diffused. Nevertheless, it is probable that such forces as these are very small if not negligible, and that "curlies" should cease to be after a lapse of some interval, the extent of which I have no means of forming even the roughest guess. The other theories of soaring are, as far as one can say, quite uninterfered with by this supposition which is in no way intended to be antagonistic to them, and the present suggestion would probably fail if the general body of air were near saturation. One cannot but await with interest further respects of Dr. Hankin's observations.

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Alexander Prize Award.

THE prize of £1,000 offered by Mr. Patrick Y. Alexander for aerial engines has been awarded by the Joint Committee of the Royal Aero Club, the Aeronautical Society, and the Aerial League, to the Green Engine Co. The winning engine developed 61·6-h.p. for two non-stop runs of twelve hours each, the revs. per min. being 1,150.

242 Miles by Barrington-Kennett.

STARTING from Bulford Camp, Salisbury, on Wednesday, Lieut. Barrington-Kennett, on his Nieuport monoplane, more than doubled his previous record for the Mortimer-Singer Army prize by covering 242 miles. He was accompanied by Corporal Ridd.

An Offer to Prospective Flyers.

AN attractive proposition is put forward by the British Deperdussin Syndicate. Briefly, for a payment of £500, those who take advantage of the offer will receive a Deperdussin racing machine fitted with a 35-h.p. Anzani engine; they will be taught until they qualify for the Royal Aero Club certificate, and accommodation will be provided for their machine during the season. Further particulars may be obtained through our advertisement pages.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Annual General Meeting.

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Thursday, March 21st, 1912, at 4 o'clock, at 166, Piccadilly, London, W.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the meeting, and must be signed by at least five members. Thursday, February 29th, 1912, is the last day for the receipt of notices of motion.

Committee.

In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the Committee are :—

Ernest C. Bucknall.	Sir Charles D. Rose, Bart., M.P.
Col. J. E. Capper, C.B., R.E.	A. Mortimer Singer.
G. B. Cockburn.	Hon. A. Stanley, M.P.
E. Manville.	R. W. Wallace, K.C.
J. T. C. Moore-Brabazon.	

Any two members of the Club can nominate a member to serve on the Committee, having previously obtained such member's consent. The name of such member so nominated, with the names of his proposer and seconder, must be sent to the Secretary in writing not less than fourteen days before the Annual General Meeting. Thursday, March 7th, is the last day for the receipt of nominations.

The following members have so far been nominated :—

*Ernest C. Bucknall.	*J. T. C. Moore-Brabazon.
*G. B. Cockburn.	*A. Mortimer Singer.
Capt. J. D. B. Fulton, R.F.A.	

* The names marked with an asterisk are those of members of the present Committee.

Members are reminded that a ballot paper for the election of nine candidates to seats on the Committee of the Club will be forwarded to them at least seven days before the date of the Annual General Meeting.

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 13th inst., when there were present :—Mr. R. W. Wallace, K.C., in the Chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Capt. Bertram Dickson, Col. H. C. L. Holden, C.B., R.A., F.R.S., Prof. A. K. Huntington, Mr. F. K. McClean, Mr. Mervyn O'Gorman, Mr. C. F. Pollock, Sir Charles D. Rose, Bart., M.P., Mr. A. Mortimer Singer, and Harold E. Perrin, Secretary.

New Members.—The following new members were elected :—Charles Ferris Montagu Chambers, John Clutton, Capt. Rowland Routledge Gibson, Diodato Giordani, M.D., Ronald Hargrave Kershaw, Commander F. Scarlett, R.N., and Mrs. Cheridah Annie de Beauvoir Stocks.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

181. Eng. Lieut. Charles Russell Jekyl Randall, R.N. (Short biplane, Eastchurch).

182. Capt. Thomas Weeding (Bristol biplane, Brooklands).

British Height Record.—The report of the National Physical Laboratory on the sealed barograph used by Mr. H. Salmet at the Hendon Aerodrome on Tuesday, November 28th, 1911, was received and it was resolved to accept the height of 8,070 ft. as a British height record.

Mr. Salmet established this record on a 50-h.p. Gnome-Blériot.

Gordon-Bennett Balloon Race.

The race for this cup will take place at Stuttgart in October next, and the Royal Aero Club will be represented by Mr. J. de Francia.

166, Piccadilly. HAROLD E. PERRIN, Secretary.

General Regulations of the Royal Aero Club for Certified Trials.

(*Under the rules of the Fédération Aéronautique Internationale.*)

1. *Object.*—The object of the trials is to test the merits of an aircraft as a whole or in part, or of an accessory, under various conditions. The competitor may make a request to have any particular quality or merit tested and certified.

2. *Certificates.*—The Club will give a certificate of the actual performance during the trial, and an official observer, or observers, will be provided for the trial by the Club. The certificate shall be a record of the trial, containing such details of the aircraft or part thereof under trial, and any observations the Club may find desirable. The Club undertakes that a copy of each certificate shall be published in the official organ of the Club.

3. *Observation.*—The trial shall be under the control and observation of the Club. The Club reserves the right to stop a trial if, in its opinion, such trial from any cause would tend to endanger life or limb.

4. *Trial Void.*—Should the competitor be prevented from carrying out the trials owing to the absence of the observer, or any cause within the Club's control, the Club may issue such certificate as the occasion warrants, and at its discretion return the whole or part of the entry fees. Should the trial be postponed or cancelled at the request of the competitor, the entry fees will not be returned.

5. *Withdrawal.*—The competitor may, at any time before the completion of the trial, give notice in writing to the Club that he wishes to withdraw from the trial, and shall state his reason. In the event of such notification, the aircraft shall, at the discretion of the observer, remain under observation until the cause thereof has been investigated and the aircraft released by the Club.

6. *Working Hours per Day.*—An aircraft in flight shall not be observed save between the hours of sunrise and sunset, unless particular provision is made therefor in the regulations agreed to by the Club.

7. *Start and Finish.*—Trials shall start from and finish at, or be held at such places as may be agreed to by the Club. The competitor shall give notice to the observer of his intention to commence the trial, and the observer shall record the moment of starting.

8. *Entries.*—Every entry shall be made upon the official entry form of the Club, and shall state the nature of the trial, and the number of days to be occupied.

No entry will be accepted unless accompanied by the entrance fee, which is not returnable, except as laid down herein.

The Club reserves the right to refuse any entry without giving a reason, or to limit the length of any trial at its discretion.

9. *Fees.*—Fees for the trial shall be determined by the Club in accordance with the nature, duration, and venue of the trial.

10. *Advertising the Trial.*—A competitor by entering for a trial agrees to accept the official records of the Club, and authorises the Club to publish them in such manner as the Club thinks fit. The competitor may publish only the full and complete certificate issued by the Club. In the event of his desiring to publish by way of advertisement or otherwise any other matter relative to the trial, he shall submit a proof of such matter to the Club before its publication. and he undertakes not to publish any such matter until he has received the written authority of the Club.

11. *Unrecognised Trials.*—No trial shall be recognised except such as is officially observed or sanctioned by the Club. Should an unrecognised trial be held, and should any publicity and advertisement be given thereto, any person taking part in such trial and/or the manufacturers and/or the machines shall be liable to disqualification and suspension.

12. *Responsibility for Damage.*—A competitor by entering waives any right of action against the Royal Aero Club for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or its representatives or servants or any fellow competitor.

The aircraft shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claim for injury either to himself, or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the Royal Aero Club in respect thereof.

13. *Definitions.*—In these regulations the word "aircraft" shall be held to mean the aircraft and/or its parts and/or accessories,

whether under test or not; the word "competitor" shall include any person or body making entry for or taking part in any trial or competition; except any passenger other than the driver or mechanic; the word "entrant" shall mean the person or persons entering the aircraft for a competition.

14. *Interpretation of Regulations.*—The interpretation of these regulations shall rest entirely with the Club, which may from time to time alter, add to, or omit from them, and may in the case of any special trial modify the regulations to suit a particular case.

Speed Trials.—*Regulations (Aeroplanes).*

1. Certificates of speed will be delivered in respect of flights over a straight course of not less than 1 kilom. Each trial shall consist of four flights out and back in quick succession, and the times will be taken at the moment of passing each mark. The speed of the trial shall be the mean of the speeds of the flights out and back.

2. The competitor shall rise from the ground to the height at which he proposes to cover the measured distance, and shall maintain approximately the same level throughout the trial.

3. All flights must be controlled by one official observer assisted by at least one official timekeeper, both previously approved by the Club, and a mark keeper, approved by the observer, at each mark.

4. The course over which the flight is accomplished must be certified by a surveyor approved by the Club, and checked by the observer, the surveyor's plan being lodged with the Club.

5. Entries must be made upon the entry form provided for the purpose, and must be accompanied by a cheque for £5 5*s*., the amount of the fee. The entry form, which must be duly filled up as regards the nature of the test and full particulars of the aeroplane, must reach the Secretary at least seven days prior to the trials.

If desired by the competitor, the carried weight shall be recorded on the certificate. For details, see Regulations 1, 2 and 3, Weight carrying.

Vertical Speed Trials.—*Regulations (Aeroplanes).*

1. Certificates for vertical speed, *i.e.*, climbing speed, will be delivered in respect of flights recorded by barograph and controlled by an official observer appointed by the Club.

2. The barograph must be provided by the competitor, and be provisionally approved, set, and sealed by the observer prior to the start.

3. The record sheet of the barograph must travel at least 6 ins. in one hour.

4. The test shall be reckoned to have commenced at the time when the competitor shall have risen 100 feet as registered on the barograph.

5. The certificate will state the time taken to rise 1,000 feet, 2,000 feet, and so on per 1,000 feet above the 100 feet starting level. Failure to attain a height of 1,000 feet above the starting level will be recorded on the certificate.

6. After the descent the competitor shall deliver the barograph to the observer, who shall take charge of it and deliver it sealed to the Royal Aero Club for examination. In the event of the competitor alighting at a distance from the starting point, he shall immediately take steps to inform the observer of his whereabouts.

7. Entries must be made upon the entry form provided for the purpose, and must be accompanied by a cheque for £5 5*s*., the amount of the fee. The entry form, which must be duly filled up as regards the nature of the test and full particulars of the aeroplane, much reach the Secretary at least seven days prior to the trials.

If desired by the competitor, the carried weight shall be recorded on the certificate. For details, see Regulations 1, 2 and 3, Weight carrying.

Height Trials.—*Regulations (Aeroplanes).*

1. Certificates of height will be delivered in respect of flights recorded by sealed barograph. The ascent must be performed in the presence of an official observer, who will independently of the barograph record the time of leaving the ground and, if possible, alighting.

2. The barograph must be provided by the competitor, and be provisionally approved, set, and sealed by the observer prior to the start.

3. After the descent the competitor shall deliver the barograph to the observer, who shall take charge of it and deliver it sealed to the Royal Aero Club for examination. In the event of the competitor alighting at a distance from the starting point, he shall immediately take steps to inform the observer of his whereabouts.

4. Entries must be made upon the entry form provided for the purpose, and must be accompanied by a cheque for £5 5*s*., the amount of the fee. The entry form, which must be duly filled up as regards the nature of the test and full particulars of the aeroplane, must reach the Secretary at least seven days prior to the trials.

If desired by the competitor, the carried weight shall be recorded on the certificate. For details, see Regulations 1, 2 and 3, Weight carrying.

Weight Carrying Trials.—*Regulations (Aeroplanes).*

1. Certificates for weight or passenger carrying will be delivered in respect of flights where each passenger carried must be at least 18 years of age and not less than 9 stone 6 lbs. in weight.

2. The carried weight shall comprise the weight of the aviator, passengers (if any) and ballast, but shall not include fuel.

3. The weight must be verified by an observer appointed by the Club, immediately before and after the flight, and all weighing must be done on Government tested machines, provided by the competitor and approved by the Royal Aero Club.

4. The attempt shall be for a minimum flight of 15 minutes.

5. Entries must be made upon the entry form provided for the purpose, and must be accompanied by a cheque for £5 5*s*., the amount of the fee. The entry form, which must be duly filled up as regards the nature of the test and full particulars of the aeroplane, must reach the Secretary at least seven days prior to the trials.

Should a further certificate be desired for speed with a given weight, vertical speed with a given weight, or height with a given weight, the regulations for the respective tests will be followed, in addition to the above, as far as applicable.

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ROYAL AERO CLUB FLYING GROUND, EASTCHURCH.

ON Tuesday last week, Engineer Lieut. Randell, R.N., flew for his pilot's certificate and fulfilled the conditions in an excellent manner, although there was a twenty-mile per hour wind on the ground as shown by the Dines Annemometer. The pace must have been even stronger up aloft. Lieut. Randell is a pupil of Captain Gerrard, R.M.L.I., who is unrivalled in *finesse* flying, and consequently he has had a good drilling in the art of neat landing, which is without doubt the most important part of an aviators training, and at which he is already very proficient.

Travers was also out in the morning with Sergeant Hedley and Meredith of the Territorials. Sergeant Hedley is now making some very good straight flights and shows great progress. Meredith, owing to bad weather, has not had much practice, but is already able to take over control when in the air with Travers on the Short Dual-Control machine. The Territorials were out almost every day during the week, being anxious not to lose any chance of practice.

On Saturday a fairly stiff breeze was blowing for the greater part of the day but this did not stop flying, nearly all the aviators being out together. Ogilvie was on the N.E.C.-engine Wright biplane, which for some time past has been fitted with a neat stream-line form *nacelle*, and which appears to be quite fast in the air. In the afternoon a number of distinguished people paid a visit to the ground, the party including Vice-Admiral Hamilton, Commander-in-Chief, 3rd and 4th divisions of the Home Fleet, Rear-Admiral Dundas, Commander Erskin, of the R.N. Barracks, Chatham, Flag Commander Best, and Captain Wilkins, of H.M.S "Antrim." The visitors saw a good exhibition of flying, seven machines being out together. Commander Samson, R.N., who is in charge at Eastchurch, was flying the "Short" Tandem Twin, which now that it is fitted with extensions, dwarfs all other machines at Eastchurch, with its sixty-foot span, Lieut. Longmore, R.N., was flying the "Short" Tractor biplane and took up Flag Commander Best as a passenger, it being the latters first experience of flying, and one which he very much enjoyed. Lieut. Longmore, by the way, is full of praise for the Tractor machine, declaring her to be the most stable machine he has yet flown. Captain Gerrard, R.M.L.I., who took up Vice-Admiral Hamilton's son for a flight, and Lieut. Gregory, R.N., were both flying constantly through the afternoon and their manœuvres were watched with great interest by the visitors.

Mr. Frank McClean, who has been away in Switzerland for the last fortnight, was back again at the aerodrome, and lost no time in getting away on the "Short" triple twin. On Sunday he took out the tandem twin, with Mr. Fowler as a passenger, and flew with great steadiness in what was undoubtedly a choppy wind. This machine, which is fitted with huge petrol tanks, showed herself to be very fast in the air even against the strong wind blowing.

Jezzi was also flying when McClean was out, and the contrast between the two machines in point of size was very great. The Jezzi biplane climbs at a very steep angle when her pilot wishes.

On Tuesday, most of the aviators were out, including Capt. Gordon, R.M.L.I., who is an adept at handling the "Short" No. 38 biplane, Capt. Gerrard, R.M.L.I., with Engineer Lieut. Randell, R.N., and Lieut. Gregory with Lieut. Malone, R.N., were both putting their pupils through a *vol plané* course.

Commander Samson, R.N., made some admirable spiral *vol planés* which were watched with great interest by the aviators on the ground. Commander Samson made the convolutions at a very short radius, and proved the possibility of being able to descend at a point almost vertical to the machine in case of engine stoppage.

Later in the day Commander Samson took up Capt. Paine of H.M.S. "Actæon." Cutler, of the Territorial Balloon Company, made some very good straight flights and two complete circuits, landing neatly.

AIR EDDIES.

IN connection with the vigour displayed by many of the French crack pilots for record-breaking just at present, some dissatisfaction seems to have arisen through the rumour that at least one of the aspirants after fame has been using a mixture of ether and petrol on which to run his engine. This mixture, it is claimed, gives a more intense explosion, and consequently the effective power of she engine is thereby increased. The increase of power is, however, only short lived, for after about three hours' running serious trouble is likely to be experienced through the property of the ether of removing all traces of lubricating oil. In fact, I have heard that the engine used by a pilot who recently put up some startling times has had to be "scrapped" for that reason.

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Replying to my note of last week regarding the danger of attempting a flight on a strange machine without first thoroughly examining the controls and ascertaining if they are all in perfect working order, I have received the following explanation from Mr. Tom Garne, to whom reference was made: "When I started for the straight flight, the switch was in perfect working order and was only disabled by the thick leather of my glove getting entangled and opening the contacts. The accident was in no way caused by this, being purely caused by side-slip through overbanking on a right-hand turn." Whatever was the eventual cause of the accident, my mind is still not quite at ease regarding that switch.

* * *

The many friends of Lieut. G. Maunde Thompson will be glad to hear that he has so far recovered from the damage sustained by his ankle through a fall from a motor bicycle last summer that he expects to rejoin the Blériot school within a week or so.

* * *

The forthcoming English military aeroplane trials will no doubt give birth to several new types of motors. The other day, in conversation with Mr. J. C. Mort, of the New Engine Co., I learnt that at their works a new motor intended for the military trials was in the course of preparation. It is to be of the 6-cylinder vertical type and has been designed to deliver 80 to 90-h.p., with a total weight of approximately 280 lbs., or about 3 lbs. per horse-power. The reason for re-adopting the vertical type is, Mr. Mort explains, due to the ease of adaption of an engine of this type to stream-line bodies, which are expected to be much in evidence in the competing machines.

The single-seater Bristol monoplane making a banked turn at Brooklands, piloted by Pizey. This machine, which is making fine way, is fitted with a 35-h.p. Anzani engine, and has a speed of about 58 m.p.h.

The regulations governing the official tests which the Royal Aero Club some time since decided to institute, have at last been made public, and it is hoped that the official recognition of the qualities of the respective machines will form a further incentive for our manufacturers to improve the design and capabilities of their productions. At least, these tests will furnish a disinterested and indisputable source of information regarding the speed, climbing and weight-carrying qualities of our present-day machines. These rules appear in the Royal Aero Club notices in this issue.

* * *

That Mr. George W. Beatty, who pilots a Burgess-Wright machine, should be able to hold a hysterical lady passenger in her seat with one hand and prevent her from throwing herself from the machine, while with the other he maintained control is, if the facts are as cabled over, surely an indication of the improvement recently wrought in the Wright controlling arrangements.

* * *

The Blériot school is certainly displaying more than usual activity just now. On Tuesday afternoon last, of a batch of five ready for their tickets, Messrs. Allen, Parr, Sacchi, Desseuter and Prensseil, the former two succeeded in getting through their tests before dusk terminated operations. The latter three should be in possession of their credentials before many more days have passed.

* * *

It is quite on the tapis that the Blériot school will soon supplement its present fleet of tuition machines by one of the new 35-h.p. Anzani-engined "Populaire" type monoplanes, a machine to which great interest attaches, as it is thought in some quarters that machines of this type, inexpensive in first cost and maintenance, will enjoy a considerable sale during the forthcoming season.

* * *

G. M. Dyott and Capt. Hamilton, both old Blériot pupils, are meeting with a great deal of success in Mexico, where they are giving exhibitions on Deperdussin monoplanes. They have lately been flying at the Santa Rita aerodrome, about 25 miles from Vera Cruz, Capt. Hamilton using the single-seater while Dyott had as much as he could do to cope with the requirements of those wishing to taste the sensation of flying as passengers on his 60-h.p. Anzani-engined passenger-carrier. Flying over the sea has apparently been a great feature with the latter exponent of the gentle art. On terminating their engagement at the Santa Rita aerodrome, they will proceed to visit several other Mexican cities where they have arranged to fly.

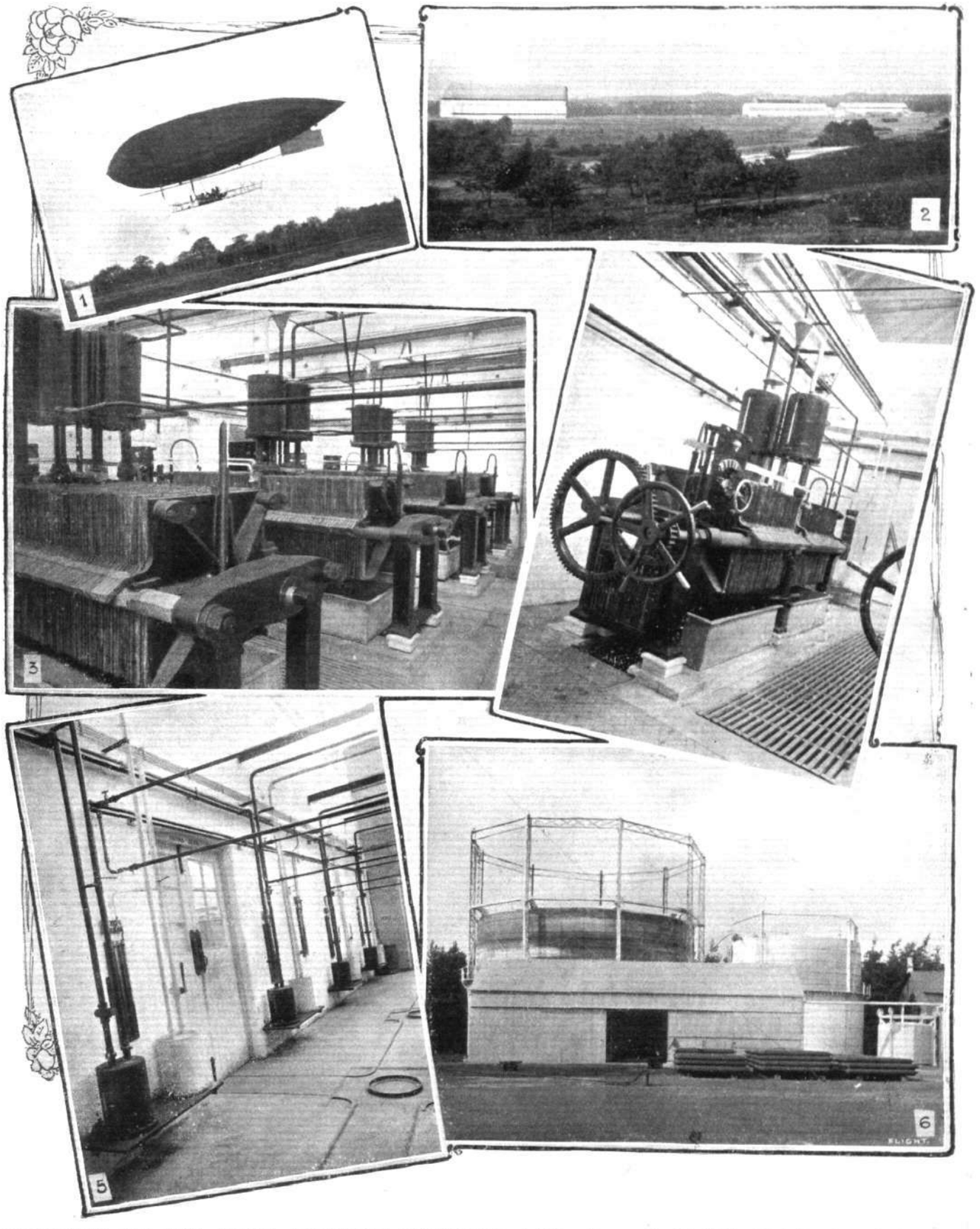
* * *

So good a reputation has been established by the N.E.C. engine in the past, especially as regards the 50-h.p. 4-cyl. V-type that Mr. Ogilvie has used with such success on his Wright biplane at Eastchurch, that great things are to be expected of this new all-British product. Provided it maintains—and there is no reason why it should not—the name that their former models have earned for their fuel economy, it should constitute an ideal engine for War Office requirements, especially as economy is an important factor where long-distance flights are concerned. As regards the ratio of weight to horse-power, it would be difficult to name its equal, and certainly impossible to mention a superior.

"OISEAU BLEU."

Hydrogen at the Army Aircraft Factory.

AT the Army Aircraft Factory there has been laid down, under the supervision of Mr. Mervyn O'Gorman, a very large installation for the manufacture of hydrogen by the electrolysis of water. The electrolisers, as they are called, were built by the well-known Oerlikon Co., in Switzerland, and the photographs opposite show some of the plant, which is of insufficient general interest to describe in technical detail. Suffice it to say that the production of pure hydrogen in quantity by this means has been a specialised study of the firm in question for some little time, and the Schmidt process that they employ is one of the most successful now in use. It is particularly interesting to remark that the power thus converted into hydrogen at Farnborough would otherwise be wasted, since it is for the most part the energy developed by aeroplane and dirigible engines that are on test in the workshop. In order to test these engines it is necessary that they should generate their full output, which in this case is absorbed by a dynamo, and employed for the electrolysis of water in the Oerlikon plant. Thus is the factory able to obtain pure hydrogen economically.



HYDROGEN AT THE ARMY AIRCRAFT FACTORY.—1. The Army airship "Beta" inflated with hydrogen obtained from electrolysis of water by the plant installed at the Army Aircraft Factory at Farnborough by the Oerlikon Co. 2. General view of the Army Aircraft Factory and balloon sheds at Farnborough. 3. General view of the electrolyser plant, showing the battery of four electrolysers and the hydrogen and oxygen separators. 4. Detail view of one of the electrolysers. 5. View of the water seals, which are metal tanks containing water through which the gas has to pass, thus obviating any danger of backfire. 6. General view of gasometers and compressor shed. The cylindrical objects in front of the shed are steel vessels in which the hydrogen is "bottled" at a pressure of about 120 atmospheres.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Flying Ground, Eastchurch.

THE report for the week follows the official notices on page 146.

Barrhead Aerodrome (Scottish Aviation Co., Ltd.).

ON Tuesday last week the snow and wind prevented flying in the morning, but during the afternoon the weather conditions were more favourable and Mrs. Lucking and H. D. Walsh had the school machine out and indulged in rolling practice until darkness put an end to the proceedings. A number of interested friends on Wednesday visited the aerodrome when Philpott was out on the school Blériot and made one or two short flights, but the engine was pulling very badly and no lengthy flights could be attempted. Friday opened a grand day for aerodrome work. Although it was very cold not a breath of wind was blowing, and the pupils, Mrs. Lucking and Messrs. Clinkskill and Walsh, got in a good day's rolling. Mrs. Lucking excelled herself on Saturday, surprising everybody by the masterly way in which she handled the school Blériot. If she is given decent weather for another week or so there is little doubt but that she will soon be in a position to take her *brevet*.

Brooklands Aerodrome.

ON Wednesday of last week the only time suitable for flying was during the first part of the morning, which the energetic Bristol school took advantage of by Fleming making two straights flights on the Bristol monoplane (his first time on it), and Pizey instructing Lieut. Carfrae in landing. The latter then accomplished his first solo flight, making excellent soft landings. The morning's work was finished by Pizey flying a couple of circuits on the monoplane at about 250 ft., machine "getting off" and climbing very well indeed. The wind then got up and prevented further work for the day, no other machines being out.

Thursday was an absolutely blank day, owing to rain and high wind.

On Friday morning Capt. Allen was out practising on the Bristol biplane before taking out the monoplane on which he is about to learn. Capt. Raleigh and Lieut. Smith both flew circuits, and Pizey was out with Lieut. Carfrae. Fleming then made two circuits on the monoplane, nicely executed and with a good landing. Next Capt. Weeding also made some flights on the biplane. Percival was flying his biplane at an altitude of 200 or 300 feet.

On Saturday the Bristol school was early at work. Lieut. Carfrae, after flying down the ground, turned round, and on coming back at about 5 ft. from the ground, his cap blew off. In attempting to save same, he must inadvertently have depressed his elevator, as the machine came down heavily on to its nose, carrying away the skids, elevator, and left main planes, and breaking the propeller. Carfrae, fortunately, escaped without a scratch. Sippe, at work on the Green-Avro, made some straights. Capt. Wood was out on Vickers No. 2; also Knight. The first-named then did some rolling on No. 3, which did not appear to be going satisfactorily. Gill also did some taxi-work on the Deperdussin.

Mr. F. Warren Merriam, who has just obtained his *brevet* on a Bristol biplane at Brooklands.

In the afternoon Spencer was up first, his machine climbing and flying excellently as usual, followed shortly by Pizey with Lieut. Longcroft as passenger. Fleming also up subsequently. Sopwith on his Wright machine made some most interesting flights, taking up passengers. Sippe flew circuits, and Young made straight flights on the Avro, followed by Capt. Wood on Vickers No. 2, who also did some taxi-ing on the No. 3 machine. Capt. Weeding, Capt. Allen, Capt. Raleigh, Mr. Nesham and Lieut. Smith all flew circuits on the Bristol, finding the wind decidedly gusty.

On Sunday morning the Bristol school was at work first thing. The wind then prevented any more flying till about 4 p.m., when, although is was still rather unpleasant, Spencer, Fleming, Sopwith and Capt. Wood were flying.

On Monday, the indefatigable Bristol school again appropriated the only possible flying weather of the day by getting down to the track early. Fleming gave instruction to Lieuts. Smith and Carfrae and Capt. Raleigh, who each subsequently made solo flights, the last named performing figures of eight in good style. Capt. Weeding then made his altitude flight, thereby obtaining his *brevet*. Fleming also took up Lieut. Longcroft, who afterwards made long hops by himself. Wind and heavy rain then supervened. Tuesday was certainly the best flying day we have had for some time. Capt. Allen, Lieuts. Smith and Longcroft flew circuits, also Lieut. Carfrae, who included a figure of 8. Remarkably quick progress as his first "swerve" took place only a day or so ago, Fleming, testing a new propeller, made two straight flights and a circuit on the Bristol monoplane, finding it less efficient than previous one. Kemp accomplished five circuits consecutively on the Flanders monoplane, which is now flying again in its old good form though a few more engine "revs." are desirable and should be obtainable. Furbank then rolled on same machine for some time. Sippe flew several circuits on the Avro, which is now flying considerably better. Lieut. Carfrae flew two circuits and right hand turns on the Bristol, followed by Nesham, Lieut. Smith, Lieut. Longcroft, and Lane. The Flanders was out again in the afternoon, Kemp flying circuits and Furbank rolling. Fisher also made some straight flights on this machine, expressing himself as being pleased with it, the lateral balance and control of which is perfect, though he is not quite sure of himself with the longitudinal control. This is probably due to his having flown machines more sluggish in this direction. Sippe again flew circuits on the Avro, whilst Setti made straights also on the Avro. Johnstone put in some good straights on the Vickers, followed by Knight, in like manner. Merriam took his first passenger, Nesham, on the Bristol, and flew two good circuits. Lieut. Carfrae performed a figure of 8, Lieut. Longcroft circuits, Nesham more figures of 8. Percival flew for some time in a gathering fog, then came down and took up a passenger, subsequently flying again by himself.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Lewis Turner, on Wednesday last week, was out on Biplane No. 2 in the morning for several circuits, but fog made flying very unpleasant, and pupils retired to workshops. Thursday and Friday weather conditions were appalling, no outdoor work being possible.

Next day saw a welcome change, and a good deal of work was managed. Turner out doing a solo flight on Biplane No. 2 prior to taking up Ramsay, a new pupil, in the passenger seat for several circuits, and afterwards giving instruction to Raphaite in the same way. Mr. Gates out on the same machine during the day putting in some good work at straight flights. Biplane No. 3 also was out in the hands of Biard, who first made a few straights, afterwards completing four circuits, flying well and making splendid landings. Raphaite was out rolling.

Weather was entirely unfavourable for practical work on Monday, and workshop instruction only indulged in.

In the morning on Tuesday, Lewis Turner was out with Monoplane No. 4 instructing Ramsay in the controls; Biard was on Biplane No. 3 making straights and circuits and showing great improvement. Ramsay in the afternoon was practising rolling on Monoplane No. 4, Lewis Turner doing circuits on Biplane No. 2 with Biard in passenger seat, Biard afterwards took over the control and put in some straights and circuits till dusk.

A.S.L. Flying School.—The very unsettled weather during the past week has prevented much flying, but Tuesday proved an ideal day for pupils. Ridley-Prentice made a trial flight on the School Green-Valkyrie terminating with a fine *vol plané*, before handing over the same machine to Mr. Busk, who put in a splendid afternoon's work. He made numerous flights the whole length of the aerodrome, attaining an altitude of 60 ft., his landings *en vol plané* becoming quite expert. Finally he successfully negotiated a half circuit, flying very well. Considering that Mr. Busk is only able to practice once a week he is really making most rapid progress, for after only four flying days he handles the machine in a masterly fashion.

Blériot School.—On Wednesday morning, the first fine day last week, taking advantage of half-an-hour of comparatively calm weather, M. Pothet did a couple of straight lines very well indeed, and is certain to be doing circuits by next week intervening weather permitting. Mr. Morris made two straight lines in good style, and Mr. Hall was also out doing rolling practice.

It was impossible Thursday and Friday to get through the least outside work, owing to the high wind prevailing, the pupils having to content themselves with theoretical work inside hangars.

On Saturday afternoon the weather was quite good enough for all the pupils to put in a good spell of hard work. Mr. Parr took the *brevet* machine out for an "airing" and did three figures of eight at an altitude of about two hundred feet, landing with a *vol plané* in quite good style. Mr. Allen then took over the *cloche* and executed a brace of eights at about 150 feet, coming down with a masterly spiral *vol plané*, as though he had made a special study of this particular mode of descent. Mr. Prenssiel then gave a small exhibition consisting of three circuits, landing with his usual *vol plané* which he is now succeeding in doing in perfect style.

M. Salmet, the school instructor, then brought out his 50-h.p. Gnome Blériot, with the object of trying a new and somewhat peculiarly shaped propeller on his machine, which appeared to be very efficient from the way the engine pulled him round several figures of eight, which he made at a low altitude and in a small space, showing the pupils with what ease and safety the machine could be banked at the turns.

W. H. Ewen School.—During the past week there have been very few opportunities for the pupils to have much flying practice. In the interval, however, the 28 Deperdussin has been thoroughly overhauled. Saturday again saw the Blériot and Deperdussin out, and the pupils of the school put in three hours' good practice. While Ewen was testing the Deperdussin, Dubois, Lawford Baumann and Warren were making good straights on the Blériot, on which the school pilot had just made a flight. Capt. Loraine, who has now quite mastered the Blériot and Deperdussin, put up some good flights, his last at Hendon before taking up his new duties at Salisbury. On Sunday the pupils waited eagerly to get some more practice in, but the wind continued too gusty all day for the school machines to be brought out. A notable visitor to the school, however, was Mdlle. La Pia, the famous *danseuse*, who was appearing last week at the Coliseum.

Tuesday was a perfect flying day, and, although the pupils abstained from practice while *brevet* tests were on, a considerable amount of practice was got in. Baumann, Dubois, and Warren made great progress, and are getting well on the way for their certificate tests. During the morning and afternoon, Ewen made four flights on the school "Dep." Remaining in the air each time for about 20 mins., he carried out some very tricky performances, always finishing up with one of his long glides, which are now quite a feature of Ewen's flying.

The first lady monoplanist in England is expected to join the school shortly.

Salisbury Plain.

Air Battalion.—Owing to bad weather and the prevalence of treacherous wind there is very little to report in the way of work in the air. On Wednesday and Thursday of last week there was no flying in progress although all concerned were busy in the hangars. Naturally, after this, the spell of fine weather on Friday was taken full advantage of, Capt. Fulton being the first to get into the air on one of the Bristol biplanes. He was followed by Lieuts. Conner and Reynolds, also on Bristol biplanes, and they all put in a lot of scouting practice round the Plains. Lieut. Barrington-Kennett was up on the Nieuport monoplane while Lieut. Hynes was testing the engine of his Breguet which has recently been overhauled. On Saturday Captain Fulton was again flying on the Bristol, and Lieut. Barrington-Kennett made a few tests with the Nieuport. There was nothing doing on Sunday, but Monday being a fair day for flying, Lieut. Barrington-Kennett started the work on his Nieuport monoplane following this up with a flight on the Bristol biplane. Lieuts. Reynolds and Conner were also using Bristol biplanes, the latter varying his height continually, the highest altitude reached being 1,000 ft. Capt. Loraine, who has been flying one of the Valkyries in splendid style, has arrived at the Plains. We are glad to hear that Lieut. Manisty, who was mentioned in our last issue as injured in a motor cyling accident, is making good progress.

Bristol School.—A considerable amount of useful and instructive work has been done at the Bristol school during the past week, on the few days on which flying has been possible. On Sunday Jullerot was up early for the usual trial, but decided that the conditions were not favourable enough to permit of school work. However, as the morning wore on, the weather became much calmer, and, after a trial, Capt. Gilbert made two solo flights on No. 43 in creditable style, banking and landing by means of a *vol plané*. Lieut. Ashton was also out for two solos, and showed evidence of the marked progress which he has made whilst at the school. Lieut. Bower, who has already taken his certificate at the school on the biplane, and who is now undergoing a course of instruction on the monoplane, was next away on No. 66, making a complete circuit, landing very neatly. Mr. Hotchkiss was out doing great things with Lieut. Roger Harrison as his passenger. Hotchkiss carried out some very clever right and left-hand turns, at times letting his passenger take charge of the controls. He landed with a *vol plané* from a good height. Lieut. Bear then started out to pass the necessary tests for his certificate, but darkness prevented him completing the trials.

The weather on Monday was, from an aviator's point of view, wretched, and all thought of school work had to be abandoned. However, as is usually the case at the "Bristol" school, instructional work was proceeded with in the hangars.

Tuesday the weather was very little improvement upon that of the previous day, and the only flights made were two passenger ones, Jullerot being the pilot.

Terrific rain was experienced all day Wednesday, rendering outdoor work impossible.

The rain had not abated on the following morning, and yet another day had to be spent indoors working upon the machines. Towards evening, Jullerot brought out a biplane and made an ascent, but found the eddies much too strong for any sustained flying.

Hotchkiss was out early on Friday morning testing the conditions, but after making two circuits it was decided to again abandon all thought of school flying, on account of the strong gusts which prevailed.

Saturday morning saw Jullerot and Hotchkiss out making trials, and as they reported favourably upon the conditions, school work was started off in real earnest, Lieut. Head being very prominent with a flight lasting fully 20 mins. He completed several circuits, making fine right and left-hand turns, and eventually descended by means of a *vol plané*. Lieut. Bower was out making a solo on

Lieut. Eric Mackay Murray, who secured his *brevet* at Salisbury on January 24th on a Bristol military extension biplane.

No. 66, and then again on the two-seater monoplane, completing circuits on both machines. Lieut. Harrison and Bendall each completed solo flights successfully, and Mr. Hotchkiss was up for a flight, as also was Lieut. Cochrane, R.N.

During the past week several new pupils have joined the Bristol school, amongst them figuring Commander Schwann, R.N., Lieut.-Col. C. O. Smeaton, &c.

Things were very brisk all the early part of Sunday morning, all the pupils taking part, and much good and useful work was done.

On Monday, rain was falling heavily in the morning, but in spite of this Hotchkiss had a machine brought out, and started up with Commander Schwann as passenger, this being the latter's first tuition flight. The object of the ascent was to see if some trueks had arrived at Amesbury Station, and this they successfully ascertained, eventually arriving back at the hangars after a very fine flight. Thus another instance was afforded of the usefulness of aeroplanes. The conditions were anything but inviting, on account of the incessant rain, and only one other flight was made, and that by Bendall.

FOREIGN AVIATION NEWS.

Six on a Sanchez-Beda.

ON a Sanchez-Beda biplane fitted with a 80-h.p. Canton-Unne motor, Colliex on the 7th inst. at Juvisy made a trial flight with five persons besides himself on board, a load of 400 kilogs.

A Military Aerodrome for Calais.

A FEW days ago Capt. Bares, commanding the Douai military centre, paid a visit to Calais in connection with the proposal to form a military aerodrome in that district. The idea is to convert the ground at Les Baraques from which Blériot started on his cross-Channel flight, into an aerodrome and to start both civil and military schools there.

Hugh Robinson gets a Ducking.

WHILE flying the Curtiss hydro-aeroplane at Nice on the 10th inst., Hugh Robinson was pitched from his machine into the sea. Although the wind was very strong, Robinson decided to make a trial, and after a short glide along the sea rose to a good height and circled twice over the bay. He then attempted to alight, but just as the floats touched the sea, a gust of wind seemed to catch the machine and overturn it. The pilot was thrown from the machine but was easily able to keep afloat until assistance arrived. Our photographs in this issue are unique of this incident.

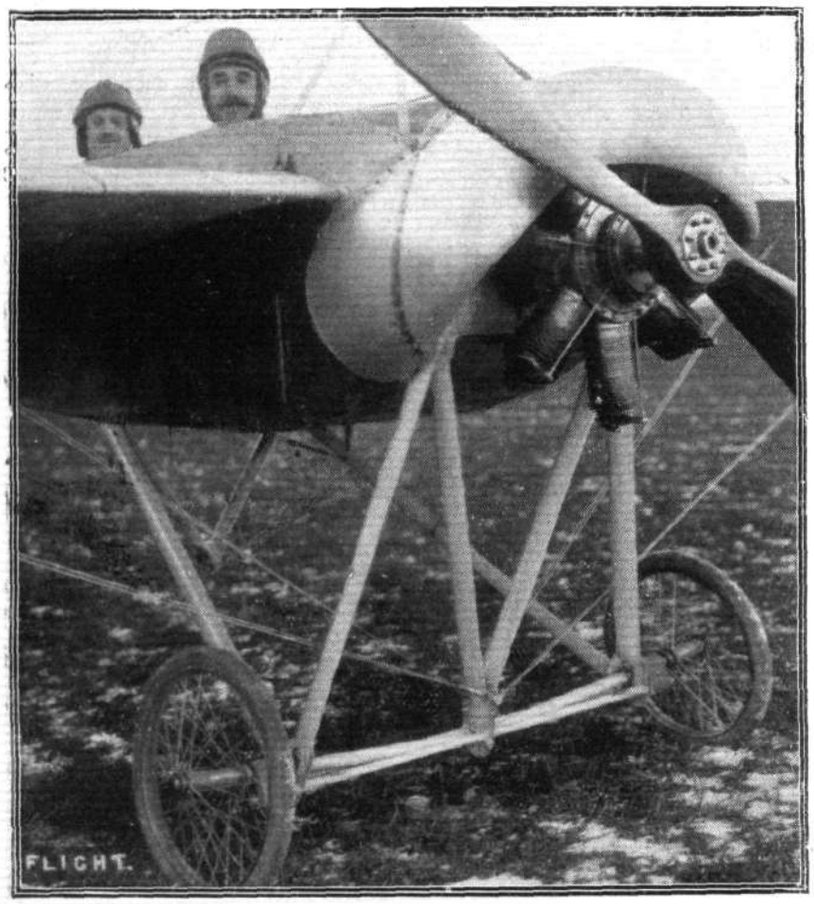
On the previous day, while giving an exhibition flight over the bay, Robinson dropped an invitation to dinner to Admiral Moreau on to the deck of the ironclad "Justice."

Vedrines at Biarritz and Bordeaux.

ON the 10th inst., Vedrines flew from Pau to Biarritz on his Deperdussin monoplane, and on Monday went on to Bordeaux where in the evening he delivered his lecture on aviation. The journey from Biarritz to Bordeaux occupied an hour and a quarter.

Bomb Dropping at Mourmelon.

BY way of practising in view of the Michelin Target prizes, Lieut. Bosquet carried out some experiments with dummy bombs at Mourmelon on Saturday. After marking out a large circle on the ground, he attached five dummy bombs by strings to his machine. While flying at a height of 650 ft. above the target, he cut the strings one by one. Four of the projectiles fell inside the target and one was outside.



THE NEW MORANE-SAULNIER TWO-SEATER.—In our article the week before last on the Morane racing monoplane, we made mention of the difficulties likely to be met with in connection with its rigid landing-chassis. However, improvements have been made, and in the chassis of the machine depicted above, which bears a very close resemblance to the racer, the designers have arrived at a very neat and efficient method of ensuring a good factor of resilience without increasing the head resistance of that organ.

The Douai Military Aerodrome.

THE Douai municipal authorities are very anxious that the French War Office shall make the military aerodrome at Douai a permanent one, and have voted a sum of 40,000 francs towards the cost of properly equipping it for this purpose.

The New R.E.P. Motor.

ON Saturday, at Buc, Gordon Bell was testing an R.E.P. monoplane fitted with one of the new 7-cyl. engines. Excellent results were obtained, the machine rising rapidly to a height of 600 metres and flying steadily for over half an hour. Afterwards on his usual mount Bell made three flights ranging from 20 to 45 mins. in duration.

A Farman Hydro-aeroplane at Buc.

THE Voisin "Canard" is not the only amphibious craft which is being tried on the pond at Buc as Lieut. Cayla is busily engaged there making some experiments with a Farman hydro-aeroplane.

The Sommer School at Mourmelon.

ON Monday Bathial made a fast trip through the fog from Mouzon to Mourmelon on his monoplane. Kimmerling gave several very good exhibition flights at Mourmelon, both on a monoplane and a biplane, and on a biplane Robinet took a passenger for a 40-minute ride.

Long Flights at Deperdussin School.

BY way of concluding his training at the Deperdussin military school at Pau, Lieut. Gourlez made a trip of an hour's duration on the 9th inst., keeping his machine mostly at a height of 1,200 ft. Two days previously he was flying for an hour and a half.

Long Flight by Blériot Pupils.

AFTER a course of instruction at the Blériot school at Pau, Sergeant Perretti demonstrated his proficiency on the 8th inst. by flying for an hour and 20 mins., his altitude during that time averaging 300 metres.

Verrept still Trying for Height.

DURING a practice flight at La Vidamee on the 9th inst., in view of his intention to try and capture the height records, Verrept climbed on his Borel monoplane up to a height of 2,300 metres.

Belgian Honours for Count de la Vaulx.

KING ALBERT OF BELGIUM has conferred the honour of a Chevalier of the Order of Leopold on Count de la Vaulx, who was one of the founders of the Belgian Aero Club. On one occasion he took King Albert for a short trip in one of his Zodiac dirigibles.

The Two-Seater R.E.P.

AT Buc on the 8th inst., Amerigo was testing a two-seater R.E.P. and took Lieut. Bruguiere for a flight of half an hour and afterwards took Lieut. Precardin and Campagne for similar trips. Gordon Bell and Legrand each made a 30 minute flight over the neighbourhood of Buc.

A Chase at Etampes.

WHILE Capt. Felix was flying at the Blériot military school at Etampes, on the 8th inst., Capt. de Goys set out in pursuit. The two officers chased each other round the ground at Etampes for an hour and forty mins., and then coming down both brought their machines to rest before their respective hangars.

Bobba has Another Mishap.

HAVING recovered from his previous accident Bobba has been practising at Pau for some time with a view to making a non-stop flight from Pau to Paris on a Morane monoplane. He was to have started on the 9th inst., but was delayed by the weather, and while making a practice flight on the following day he was surprised by a fall of snow. For some unexplained reason the machine suddenly dived and the pilot was unable to right it before it crashed to the ground. It was at first feared that the pilot was seriously injured, but the doctors report that no bones are broken, and with a rest Bobba will soon be quite fit again.

A 100-h.p. Henry Farman.

ON the 10th inst., notwithstanding the very strong wind, Fischer at Chalons took out the Henry Farman 100-h.p. machine, destined for Lieut. Mailfert, for its trials, and with the full weight of 300 kiloms., *i.e.*, under the conditions of the *Concours Militaire* at Rheims, attained a height of more than 500 metres in 7 mins. Lieut. Mailfert proposes to use this machine in his trials for the Michelin target prizes.

The Military Aerodrome at St. Cyr.

THE above ground is now getting busy, and on the Maurice Farman machines recently delivered to the Government, Lieuts. Cheutin, Leclerc, and de Marzac are flying daily. On Saturday last, Irat could be seen flying over Versailles at a height of more than 1,000 metres, returning afterwards to the aerodrome at Buc, where Maurice Farman is busy trying the 1912 machines, and Renaux continuing the trials of the new small Maurice Farman.

Taking Home His Mount.

HAVING bought a new Blériot-Gnome and taken delivery of it at Etampes, Lieut. Marlin, on the 6th inst., set out to fly it back to Rheims, where he is stationed. Although it was raining he made a start at a quarter to nine in the morning, and an hour and 35 minutes later arrived safely at the end of his 160 kilom. journey.

French Officers and Michelin Prizes.

HAVING applied to M. Millerand, the French Minister of War, to permit the *officiers aviateurs* to take part in the various competitions organised for Michelin prizes, M. Michelin has now received a letter from M. Millerand conveying the information that the permission has been granted and suitable instructions issued to the Inspector-General of Aeronautics.

Military Orders by Aeroplane.

ON the 10th inst., Lieut. Cauter, one of the German Military pilots at Doeberitz Camp, received orders to take Capt. Wagenfuhr to Brandenburg in order that the latter officer might drop some orders to the Commander of the Regiment of Cuirassiers stationed there, and then returned to Doeberitz without landing. This manœuvre was successfully carried out.

A New German Military Aerodrome.

THE new military centre which is being arranged at Kummersdorf, about 70 kiloms. south of Berlin, will include an aerodrome.

Cross-Country Flying in Germany.

STARTING from Doeberitz Camp, Lieut. Fisch, with Lieut. Carganico, flew 110 kiloms. in 55 minutes, and landed on the frozen surface of Lake Muritz, not far from New Strelitz. Continuing their journey in the afternoon, the officers went on to Oranienbourg, but in the teeth of the wind the 92 kiloms. journey took two hours and a-half.

Long Passenger Flight in Germany.

A FINE cross-country flight was made by Lieut. Barend on his Rumpler monoplane on the 9th inst. when he flew with Lieut. Solmitz from Doeberitz to Hamburg, a distance of 130 miles in 2¼ hours. The return journey was made with equal success two days later, a stop being made at Ludwigshest for lunch.

The New Military Zeppelin.

"ZEPPELIN XI," which is to be stationed at Frankfort, measures 148 metres in length, or about 8 metres longer than the "Schwaben." The 18 ballonets have a capacity of 19,000 cubic metres, giving a total lifting force of 22,000 kilogs. The forward car has a 145-h.p. Maybach motor, while the rear car is fitted with two motors of similar power. With two motors working, the speed is said to be 61 k.p.h., while at full power the speed is given at 72 k.p.h. The central cabin is arranged for 20 passengers.

With the Aeroplanes in Tripoli.

ALTHOUGH authentic news of the aeroplane is very difficult to obtain from the reports which have been received, there seems no doubt that the aviators have proved how useful they can be. On the night of January 17th a party of 400 Arabs attacked a blockhouse held by 18 Italians near Benghazi. During the fighting, Lieut. Gavotti ascended on his Farman biplane, and flying over the enemy, dropped some bombs on them, with such effect that they speedily retired, leaving a number of wounded behind.

Obre and Duval at Tunis.

HAVING got clear of the Italian military authorities, Obre and Duval commenced their series of exhibitions at Tunis on the 8th inst. Although the wind was not at all pleasant both Obre on the monoplane of his own design and Duval on a Caudron biplane made a circular flight of 60 kiloms., passing over Carthage, Ariana, Lamanouba and Tunis.

Two Deaths in Russia.

TWO pupils at the flying school at Sebastopol met their deaths on the 8th inst. They were flying on a biplane when it fell to the earth, and, the wreckage catching fire, the aviators were burnt to death before assistance could reach them.

Flying Across America.

STARTING from San Francisco on December 11th last, Mr. Robert G. Fowler arrived at Jacksonville, Florida, on January 10th, having taken 15 days for the journey across America.

A Starter for Aeroplane Engines.

A DEVICE for starting up engines of aeroplanes from the driver's seat has been devised by Frank Coffyn, who has lately been experimenting with a Burgess-Wright hydro-aeroplane. It was the difficulty experienced in starting the engine of this machine which led him to go into the question, and the device primarily consists of a shaft, one end of which carries a handle, while at the other is a gear wheel which meshes with another gear wheel on the fly-wheel. The device is being considered by the Wright Bros. with a view to adopting it as part of the standard equipment of their machine.

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AVIATION IN THE FRENCH ARMY.

SOME details regarding the rapidly expanding organisation of the "fourth arm" of the French Army were given by M. Millerand in the Senate on Tuesday last. After stating that fifteen airships were to be built, he explained that the aviation section of the army would be divided into "squadrillas," of which thirteen might be constituted to commence with. A "squadrilla" would comprise eight aeroplanes, eleven or twelve motor cars, one traction-engine, one racing motor car, and a repairing car and van. By the end of the year they would be able to mobilise twenty-seven field and five garrison squadrillas, making a total of 344 machines, and during the year thirty aviation centres would be fitted up. The flying regiment would be divided into seven companies and would consist of 234 officer-pilots, 210 scouts, 42 mechanics, 110 officers, 1,600 sappers, and 550 privates. M. Millerand pointed out that the money already voted for aviation, 12,000,000 francs, would be insufficient, and he proposed to bring in a special bill setting aside a further 11,000,000 francs for material, and 1,000,000 francs for personnel, making a total of 22,000,000 francs (£880,000). Next year's expenditure would be 25,000,000 francs (£1,000,000). It is also proposed to add 3,000,000 francs to the 5,000,000 francs already provided for aerostation (balloons and dirigibles). M. Delcasse, Minister of Marine, stated that a special machine was being tested for the Navy.

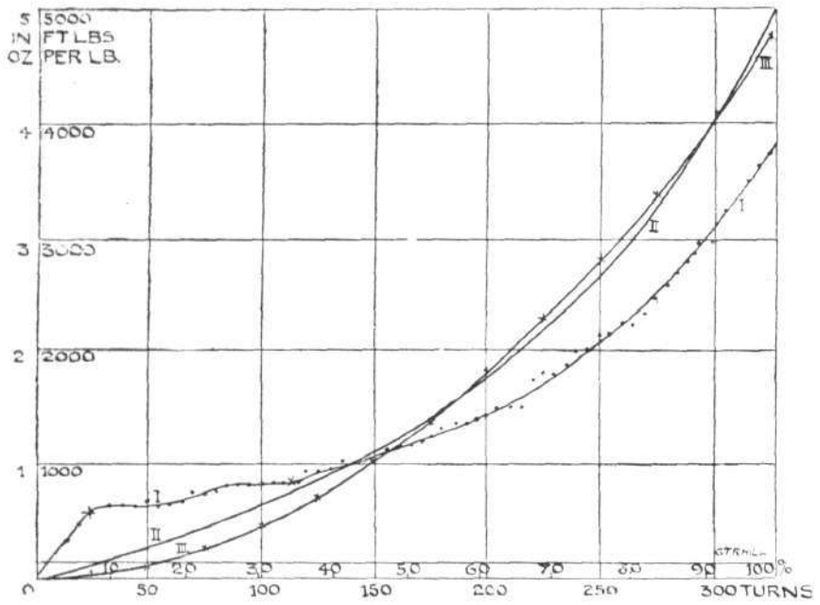
Models

Conducted by V. E. JOHNSON, M.A.

The Foot-Pounds of Energy Storable in a Pound-Weight of Rubber.

WE have much pleasure in publishing the following communication received from Mr. G. T. R. Hill relative to the above :—

A motor of four strands, 6 ins. long, of Clarke's broad strip rubber, well lubricated with Twining's lubricant, was used, and its torque was measured at intervals when winding up to the breaking-point. The elastic broke at 328 turns. Curve I in the diagram was plotted showing the torque, which is correct to within about 3 per cent. in inch-ounces for any number of turns up to the breaking-



point. Since the work done by a couple or torque when turning through n revs. is $2\pi nC$, where C is the value of the torque or couple, we see that the work is proportional to the average torque and the number of revolutions; which is represented on the graph by the area under Curve I. Curve II is the sum curve of Curve I, and has this property, that its ordinate at any point is proportional to the area under I up to that point, and consequently is proportional to the energy stored in the elastic when winding it up to that point. Thus from II we can read off the energy stored, if the elastic is twisted up to its breaking-point or for any percentage of this number of turns.

Curve II is nearly a parabola, as it will be seen that its ordinates do not differ very much from those of III, which is actually the parabola $x^2 = 8{\cdot}8\,y$. Thus the energy stored increases nearly as the square of the number of turns, in fact towards the breaking point it increases faster than this. Twisting the elastic to 75 per cent. of its maximum turns, which is a reasonable limit, as we do not want to strain the elastic, we see that 1 lb. can store some 2,600 ft. lbs. of energy, a figure considerably above that given by other experimenters.

It is not possible to find the amount of energy that can be stored in elastic by an experiment in which a weight is wound up. This method would do quite well if the torque were constant, but from the diagram it can be seen that it is very irregular, so that the elastic would wind up a very much bigger weight at the start than it could, say, when half run out, so what is wanted is a gradually decreasing weight; in fact, the weight should decrease as the ordinates of the torque curve decrease from right to left in the diagram. Referring to the curves, we see that if the weight were adjusted so that it could be wound up till only ten turns more of the elastic were to go, about ten times that weight could have been hung on at the beginning.

The two crosses on the torque curve show when the knots began to form and when one set had all formed. This forming of the knots probably accounts for the irregularity of the curve, and thus bars an experiment with winding weights.

On receiving Mr. Hill's communication we forwarded it to Mr. T. W. K. Clarke, as being the original authority for stating that some 300 ft. pounds of energy could be stored up in a pound weight of rubber. Mr. Clarke in his reply quite agrees with Mr. Hill's conclusions as correct; he points out, however, that all the results were in favour of obtaining a high value. His own (and in fact all previous) experiments were carried out with unlubricated rubber, and were of a rough-and-ready nature in the open some three-and-a-quarter years ago. The number of strands was also very large, about 40; whereas Mr. Hill was using only 4 strands, well lubricated and (probably) so arranged that each took its full share, which is quite impossible of attainment when the number of strands is large.

The method in which Mr. Clarke's experiments were carried out was (briefly put) as follows :—"A spring balance was attached at a marked distance along the propeller; after a certain number of windings the torque was read in each case. Friction was eliminated by taking the mean between the two scale readings when the balance was pulled so that the propeller was about to wind up, and when it was slacked off so that the propeller was about to unwind; being unlubricated and the strands many, the windings could not be taken to anything like the extent of Mr. Hill's experiments."

Mr. Clarke also refers to another important point which appears to have been quite generally overlooked with respect to rubber.

Most people think it curious that the load-extension graph is not a straight line—as, indeed, they say it should be. This, however, is not the case; for the load in Hooke's Law, which does cause a proportionate "extension," is the load per unit of section. Of course, in ordinary springs this cross-section remains constant, but with such extensible stuff as rubber the cross-section is approximately inversely proportional to the total length, so that the graph, instead of being of the form

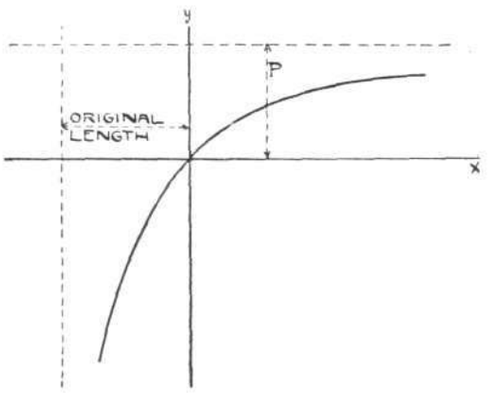
$$y = mx \qquad \text{(i)}$$

y being the actual load and x the extension, is of the form—

$$(1 + x)y = mx \qquad \text{(ii)}$$

Now those who have had the pleasure (?) of making the acquaintance of co-ordinate geometry will at once recognise what these two equations represent, viz., the first a straight line, the second a rectangular hyperbola, with its axis parallel to those of x and y, thus :

A curve, as Mr. Clarke says, which is far more like the real thing (so long as the elastic limit is not passed). The asymptotes show (i) that you can never compress it to nothing; (ii) that there is a certain load, P (never reached), such that (P – load) × corresponding total length = a constant.



There is also another point of considerable importance, viz., with respect to the *resilience* of rubber which is not without its bearing on Mr. Hill's most interesting and valuable experiments.

Referring to some experiments made by us ("Model Aeroplaning," page 25) with square rubber, the fact that the rubber *was* square is not, however, expressly stated. Mr. Clarke says: "As the load carried in the three cases shown in Fig. 14 for a given extension is *not* proportional to the cross section of the rubber in these cases, it made me think, perhaps, the rubber was not square. One would expect the load for a given extension proportional to $a\,d^2$

(d being the diameter), but if d is measured in $\frac{1}{16}$" in the above particular cases, the load is almost proportional to $\frac{1}{4}(3d + d^2)$, which would seem to show that the *surface* is also a factor in increasing the resilience. In other words, that the surface is more resilient than the inside bulk, a fact that would tend to show why (as many aeromodelists say) flat rubber is better than square."

A point not referred to by Mr. Clarke is the fact that the *quality* of the rubber has very possibly been much improved in the last three years. Mr. Clarke, in his letter, enclosed a sample of rubber (presumably) similar to that used by Mr. Hill—it is beautiful stuff—the finest sample of rubber we think we have ever come across.

Mr. Hill's experiments, we are sure, are such as will be keenly appreciated by all aeromodelists, the one thing that Mr. Hill can do to make the debt which they owe him complete is to undertake a series of experiments which will tell us—*not* the amount of energy which can be *put into* a pound weight of rubber—but that far more interesting (and we candidly admit) difficult problem—*how much can be taken out of it*?

Referring to Mr. Hill's remarks on experiments in which a weight is wound up, there is nothing theoretically wrong with such experiments. Practically, of course, at starting, the torque must be considerably more than sufficient to lift the weight, the superfluous amount being expended in creating kinetic energy, which is ultimately expended in overwinding, causing up-and-down oscillations—which it was, we admit, very difficult to allow for. If you damp out such oscillations by means of friction, then the friction is difficult to allow for. Finally, in our case, as in that of Mr. Clarke's, the number of strands was large, the rubber was old (or, at any rate, not fresh), and it was unlubricated.

If the reader refers to Mr. Hill's letter on "The Limit of Long-Distance Flyers Propelled by Elastic," FLIGHT, September 23rd, 1911 (and everyone interested *should* so refer), he will at once see, on the assumption that the rubber is capable of giving out only some 75 per cent. of the energy stored in it, *i.e.*, 75 per cent. of 2,600 ft. lbs. per lb. weight, that we have every reason to expect in the future a very considerable increase in the distance that such models can travel, and that our present models do not possess the high degree of efficiency which some would have us believe.

The gliding angle is after all the real test of efficiency—could we attain in the case of models to anything like the gliding angle exhibited by the best form of soaring birds (certainly not less than 1 in 20 or 30, a possibly 1 in 40 or 50) then the possible length and duration of flight would be vastly increased—provided such a result could be brought about without any practical increase in resistance such as skin friction, &c. For it is the gliding angle which is the predominating factor in the rate at which the stored up energy of the rubber is being consumed.

Replies in Brief.

R. HALL.—Mr. Bragg-Smith informs us with respect to the scale drawings of his model (to which you refer, and which appeared in the issue of April 15th, 1911), that the correct dimensions are, total length, 71¼ ins.; span, 57 ins.

F. ROBINSON.—Your model simply did what we have noticed models of the 0-1-1-2P type always have a tendency to do; a very nice adjustment is necessary; it looks as if yours was not fine enough. It might be caused by a too close proximity of plane and tail, but you do not state actual distance so we cannot say. The drawing sent we conclude refers to your last model only.

E. J. P. MIMALLA.—It has been shown experimentally that a well-designed propeller always sucks in air from around its periphery, and does not fling it out radially unless the pitch angle exceeds 45°. Consequently, your conclusions, namely, that exceptionally good results can be obtained by affixing to the tip a short metal plate at right angles to the plate, can only be due to some peculiarity of the propeller used by you. If you care to send us one of your propellers for inspection, we shall be pleased to report further on the matter. When the pitch angle is less than 45° the air leaves the propeller (practically) in a cylindrical column.

D. MCKAY.—Electric motors, with or without accumulators, are useless. Some people have a very vivid imagination.

H. W. DUNN.—Received—but you do not state weight of rubber or length of flight.

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THE KITE AND MODEL AEROPLANE ASSOCIATION.

(27, VICTORY ROAD, WIMBLEDON.)

The Paramount Body to Govern Models in this Country.

OFFICIAL NOTICES.

Annual General Meeting.—The annual general meeting was held on Monday, February 5th. Mr. C. R. Fairey was elected to the chair.

The officers elected to serve for the ensuing twelve months were:—*President*—Lieut.-Col. F. C. Trollope (late Grenadier Guards); *Vice-Presidents*—Col. J. D. Fullerton (late R.E.) F.R.G.S., F.Z.S., W. H. Dines, Esq., F.R.S. (late President R. Met. Soc.), F. Hedges-Butler, Esq. *Advisory Council.—Committee*—Messrs. Douglas Archibald, M.A., R. M. Balston, W. B. Brooke, H. W. Browse, T. W. K. Clarke, A.M.I.C.E, S. F. Cody, C. R. Fairey, B. M. Gillman, T. O'B. Hubbard, H. E. Hughes, V. E. Johnson, M.A., J. H. Ledeboer, M.A., F. T. Pringuer, George Roach, George Rowlands, G. P. Bragg-Smith, E. W. Twining, B. S. Varnals, C. Fleming-Williams, W. H. Akehurst (*Hon. Sec.*).

The report and balance-sheet for the year was passed as read on the proposition of Mr. Bragg-Smith seconded by Mr. E. W. Twining.

It was proposed that in future that the Official Notices printed weekly in FLIGHT and monthly in *Aeronautics* and in the Aviation Fixture Column of the *Morning Post* be sufficient notice to members, and that the hon. sec. shall only send to members notices of special events. The Chairman putting it to the meeting it was carried unanimously.

A hearty vote of thanks to Major B. Baden-Powell was proposed and carried unanimously for his continued and personal interest that he had taken in the Association during his three years as President.

A discussion which followed the general business upon the suggestions for competitions for the year, made by members, will be a great help to the rule Committee.

A vote of thanks to the Founder and Hon. Sec., W. H. Akehurst, was carried unanimously.

Testimonial to Major Baden-Powell.—It was decided that a testimonial should be given to Major B. Baden-Powell as a slight token of esteem and for the interest he has taken in the Association. It is hoped that members and friends will subscribe generously towards it, and subscriptions should be sent at once to the hon. secretary. The form of testimonial depends upon the amount received. The presentation will take place at The Plumes Hotel, Park Royal, when the Association officially takes over the man-lifting kite outfit that he has presented to the Association.

Subscriptions.—Subscriptions are now due and should be forwarded without delay to the hon. secretary.

Members should note that the observed flights for models will take place on Wimbledon Common to-day, February 17th, at 3 p.m. They will take place on the plain, Wimbledon side of the windmill.

All members must have their motor rods protected when flying on public spaces.

Badges.—Members requiring badges of the Association can obtain same from the hon. secretary at 2*s.* 6*d.* each.

W. H. AKEHURST, Hon. Sec.

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PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

MODEL CLUBS.

Aero-Models Assoc. (Sec., MALCOLM B. ROSS **(N. Branch)** 15, HIGHGATE AVENUE, N.).

ON Saturday last M. B. Ross and R. G. Corder paid a visit to the Palmer's Green Aero Club. There was a successful duration event. Corder had hard luck, but Ross managed to put up 52 secs., and carried off third prize. In future there will be flying every week end at the club's flying ground (Messrs. Viver's and Sons, Lodge Farm Dairy), East Finchley, N., at 3 p.m. Saturday, March 2nd, duration competition; entrance fee 3*d.* (payable on ground) shared for prizes, first, second, and third.

Aberdeen Aero Club (Sec., A. SEFTON, 387, HOLBURN STREET, ABERDEEN).

ON Saturday a large number of members turned up at Kincorth flying ground, where some very creditable flights were obtained. Mr. D. Brown's model flying in usual excellent style. Mr. Scott also had some very good flights but was greatly hampered by repeated breakages of rubber. Rapid strides are being made with

construction of glider, and it is expected that members will be experimenting with same in a few weeks time. Meeting will take place to-day, Saturday, as usual, and a business meeting will be held in club room at 7.30 p.m.

Birmingham Aero Club (Secs., R. COBHAM, G. H. WOOD, 8, FREDERICK ROAD, EDGBASTON).

MR. TRYKLE'S lecture on "How to Make My Model" was enjoyed by all on February 5th. The construction of his famous model, and all the small details which are so valuable in the construction of a successful model were given by him.

The work on the glider was carried on outside the shed last week end, the weather being so fine. The best flights of the afternoon were obtained by Master Stamps, his average flights being 300 to 400 yards. Good flights were also obtained by Master W. S. Jones with his "Mann" monoplane and Mr. G. Baker. Mr. E. Trykle was testing some new planes.

The next day Mr. E. Prosser increased his gliding record by one yard. This flight of 34 yards was made down the gliding hill with the wind.

Messrs. E. Trykle and B. W. Beeby have now commenced on the construction of their glider, while the Haddon glider is nearing completion.

Blackheath Aero Club (Sec., A. B. CLARK, 12, MANOR ROAD, BROCKLEY, S.E.).

THERE was a splendid attendance of members at Kidbrooke last week, and some good flying was witnessed. Mr. H. H. Groves made several excellent flights with one of his bamboo biplanes, as did Mr. H. H. Pizey with an "A"-frame mono. Mr. F. M. Bailey's Antoinette was in fine trim, although it would persist in "circling." Other flights were made by Messrs. G. Brown, A. E. Woollard, L. Conolly, A. E. Egelstaff, and C. B. Holland; and Mr. A. B. Clark was flying his 2¾-oz. "Victor," but could not better the previous record distance flown by this model, viz., 2,265 ft.

Messrs. Brough, Clark and Hoch were flying on Blackheath; and at the Lee Aerodrome, numerous spectators saw some "exciting" flights—caused by a gusty wind. At this ground, Mr. F. M. Bailey gained his second-class certificate with a flight of 320 yards. Mr. Bailey was using his 6½-oz. monoplane, fitted with Antoinette-type wings, and the "circling" trouble has quite disappeared now that a fin has been placed on the front of the machine.

Mr. L. Conolly on several occasions flew the necessary distance for his certificate, but these flights were not officially measured. Mr. Whitworth was experimenting with a "twin-tractor" but was unable to get a respectable flight with the twin screws. Half-an-hour later this was converted into a "single" and the usual good flights were made. Messrs. C. Ford and Jarvis were also flying and Messrs. F. Peter, E. Hoch and H. S. Richards entertained many spectators at the C.P. testing ground.

Will members please remember these dates:—February 24th, at 6 p.m., general meeting at the Central Hall, Peckham, to discuss new rules, &c. March 9th, at 3 p.m., point-to-point competition, for members only, at Kidbrooke. There will the usual flying at Kidbrooke, Blackheath, Lee, and Crofton Park, and good attendances are anticipated if weather permits.

Brighton and District Model Ae.C. (Sec. A. VON WICHMANN, 36, LITTLE PRESTON ST.)

FINE afternoon's flying at Shoreham on Saturday last. Mr. Bate's geared motor-model, flew high but refused to fly straight. Doing up to 400 yards with light high-flyer. His 4 ft.-model is nearly ready. Fuselage design quite new, and gearing for geared-motors cause very little frictional losses. Altogether, this model is something more than ordinarily fresh. Mr. Burghope flying 21-oz. 'bus. After a month's rest big model, which looks very travel-stained, made long flights but rather uncertain as to direction. It was found that wings had warped after being used to chastise dog. 2-oz. model again looping-the-loop, and small biplane doing little circles. Mr. von Wichmann flying old 1—1—P$_2$. Mr. Frost testing "tractor," Antoinette, rose easily and flew 25 yards very fast. Taxied over turf in fine style and rose in 12 ft. Set of "Mann" parts critically examined and pronounced excellent. General meeting Thursday, 22nd, 8 p.m. All communications to A. von Wichmann, Hon. Sec., "Kingsleigh," Kingsway, Hove.

Bristol Model Flying (Sec., R. V. TIVY, 3, ROYAL YORK CRESCENT, CLIFTON).

AN enjoyable meeting was held on February 10th. Howse's 1-1-P machine flew 750 ft. showing perfect stability. Secretary's 15-in. 1-1-P, with wings "brought back," weight ¾ oz., rubber 1$\frac{1}{8}$ oz., flew 600 ft., but appeared dangerously unstable. Keytes' beautifully constructed 1-1-2-P, with upturned wing tips, flew 400 ft. "as if hung on wires." "Ideal model turbine" excited great interest. Next meeting, February 17th, at 3 p.m., at Sea Walls.

Cardiff Aero Club (114, MISKIN STREET, CATHAYS).

SEVEN members were present at Monday's meeting, including Mr. C. Griffith, late of Arundel House, Surbiton. It was arranged to go to a meeting at the Cardiff Model Engineers Club, in regard to an exhibition taking place about April 17th, to be followed by a whist drive.

Croydon and District Aero Club (129, HIGH STREET).

THE club had a good turn out on Saturday last. Mr. Hart's model flew over ¼-mile on three consecutive occasions. Mr. C. Smither flew one of his models with a "Redival" type plane which was very stable. Messrs. Pavely and H. Smither were flying minature twin propeller biplanes of different types, all of which flew distances of about 100 ft.

Mr. Pavely has made a twin-tractor biplane of his own design with a biplane tail which will be tested to-day (Saturday), and other new machines will include a twin-propeller biplane and a new stability model.

We shall be pleased to see any prospective members at our meetings on Mitcham Common on any Wednesday or Saturday.

Dover and District Model Ae.C. (Sec., H. D. DAVIS, "OAKVILLE," GODWYNE ROAD, DOVER.)

MEETINGS were held on Wednesday and Saturday afternoons last week, on the Northfall meadow. Holman and Whorwell showed the club some real good flying on both occasions, other good results were obtained by A. G. Wicks, H. D. Davis and R. C. Wilson. A. G. Wicks deserves special credit for the big strides he has made in Model Aeroplaning. At Wednesday's meeting Holman's model made a remarkable flight by shooting up in the air *à la* helicopter, diving, making some very sharp turns and landing like a feather. Saturday's meeting H. D. Davis completed the tests for his 2nd class *brevet* and A. G. Wicks would have got his, had his machine not bucked at the right hand turn. Quite a number of spectators watched the flying with unusual interest. Will all members make a point of being present at Saturday's meeting. Non-members heartily welcomed.

Ealing and District Model Ae.C. (Sec., B. J. Kirchner, 1, QUEEN'S GARDENS, EALING, W.)

A MEETING took place at the club room, 68, Pittshanger Lane, but owing to rather small attendance, not much business was gone into. Members are asked to turn up at meeting on Wednesday, the 21st inst. at 8 p.m. at club room. At last meeting several members tried novel paper gliders.

On January 27th there was keen competition for a pair of propellers kindly offered by Mr. L. Roche, the winner to be competitor having best average of three consecutive flights without adjustment. Master C. Roche was the winner, with an average of 355⅔ ft., while Master L. Kirchner was the "runner up," with average of 309½ ft. Mr. L. Roche kindly gave another pair of propellers to the "runner up," as the winner flew a L. Roche model. Messrs. Beeching, Esch, Butler, Chilcott, and Grierson, made good attempts, but were not consistent. Mr. L. Roche brought the club's duration record up to 35 secs., which he did twice, also doing flight of 663 ft. His model got up to good heights, and was very stable. There was a big crowd of spectators who took a keen interest in proceedings. Two new members were enrolled. A prize has been offered by a member for competition, conditions to be announced later. Members please note that flying meeting will be held to-day, Saturday, at 2.30 p.m., at usual place. Committee are contemplating the granting of certificates for various performances, conditions of which to be announced later.

Hackney and District Aero Club. (Sec., B. H. LONGSTAFFE, 47, JENNER ROAD, STOKE NEWINGTON, N.)

ON Saturday last fine flying by Messrs. Weston Hurlin, Macbirnie and Gittus. Mr. Weston found ground too small, one of his machines doing ¼ mile over house tops. Mr. Hurlin obtained fine flight across wind of approximately ¼ mile with one of his small W.H.C. models. Mr. Macbirnie's models were exciting great interest among spectators by their manœuvres. To-day (Saturday) flying will take place over Mill Fields as usual.

Higher Broughton Model Soc. (1, ESKRIGGE ST., MANCHESTER).

ON February 5th Messrs. Ed. Hurleston and E. Whittaker were flying the former's model. Three fine flights were obtained, two of which exceeded the ¼-mile.

On February 10th the same enthusiastic members obtained half-dozen further fine flights, two of which were "¼-miles." In the evening the secretary, Mr. W. M. Bloomenfield, read a short paper on Aeronautical Terminology.

A good time is being arranged for during the coming months. New members will be welcome. Communications to Mr. W. M. Bloomenfield, Hon. Sec., 55, Teneriffe Street, Higher Broughton.

Macclesfield and District Ae.C. (BLAKELOW RD., MACCLESFIELD).

ON February 11th, although weather very bad, Mr. Flut made a good flight whilst trying for the ¼ mile which might have been successful only after about 300 yards his monoplane finished up a tree. Mr. Horner's model made a straight flight of 300 yards then wound out.

A race, in which Mr. Horner's model proved to be the fastest, was great sport, with Mr. Fleet's close behind. The club's altitude was also made by Mr. Horner's model, with about 180 ft. This model is rather a novel design and seems quite stable. The main planes of wire are the exact size and shape of a sea gull's wings, being taken from a pair which Mr. Horner procured whilst away at the seaside. It also has a triangular tail behind, lifting type, two propellers, main plane first, no elevator or rudders, wings turned up at tips, bird-like appearance, length 3 ft. × 1 ft. 9 in.

Paddington & Districts Ae.C. (Sec., W. E. EVANS, 133, BUCHANAN GARDENS, HARLESDEN).

ON February 7th, W. Evans gave lecture on "Selecting Wood for Models." The results of tests of 18 different woods including bamboo and cane, tested for weight, rigidity and pliability, were placed before the members who thus have a collection of valuable data, not otherwise obtainable. Lecturer concluded with remarks upon the special utility of each kind of wood, &c.

On Saturday last good muster of members with models at Parkside. Carter and Woolley tuning up Fleming-Williams and rise-from-ground models made in club workshop. The former proved less stable in a breeze, best flight 200 ft. Latter gave good flights, Woolley's model doing 414 ft. Lane's "A" monoplane made circular flights 150 to 200 yards. Davidson's 0-1-1-P_2 model very fast, 50 to 120 yards, requires tuning up. Chalfont's "A" monoplane 50-yard flights, broke wing. Holden's "A" machine steady flights of 50 yards underpowered. Evans again had good straight flights, best being 458 ft. Distances in feet were measured.

Members having models entered for first workshop competition must have their machines ready for judging for construction by 7 p.m. to-day (Saturday). Judges—Mr. Davis of Twining's and Mr. Hurlin, of Weston Hurlin Co. Models will be sealed until flying competition at Parkside, Saturday, February 24th, at 3.30.

Full particulars and advantages of membership from secretary.

Reigate, Redhill and District Aero Club (Sec., H. V. MAY, 4, LONDON ROAD, REIGATE).

ON Saturday Mr. Lewis, with his "Baby Almono," made some very steady flights, his machine coming round to the wind splendidly. Mr. May had his first club model out for tuning up, and more than once covered 800 ft., straight line measurement. In a point-to-point competition Lewis had a good deal of trouble to keep his machine from circling, while faulty launching put May behind. Mr. May won by a single point. The afternoon finished with a "gliding circuit." The rubber was removed from the machine, and although the wind was heavy for the lightest models, some very fair gliding was seen, Mr. May again heading Mr. Lewis by a point. Next day Mr. Lewis was testing several wings, and endeavouring to cut down his weight of rubber. Mr. Morris was trying a new biplane. Mr. Lewis' new wood-winged biplane refused to get up much over 15 ft., the best distance being 500 ft.

Scottish Ae.S. Model Aero Club (6, MCLELLAN STREET, GOVAN).

ON Friday last week in the Institute, Mr. D. N. Robertson delivered an interesting lecture on "Petrol Motors," and a keen discussion on the subject followed. During the evening Mr. McKim showed a neat two-cylinder opposed steam motor for model aero work. He also demonstrated it working with compressed air. This tiny engine weighs, without plant, about 4 ozs., and develops $\frac{1}{10}$ h.p. for about five minutes. Further developments are awaited with interest. Mr. Graham also showed his petrol motor which is now nearing completion. On Saturday there was a good turn out of members at Ibrox. Splendid flying by Messrs. Balden, Arthur, Lameron, Langlands, Graham and several others Mr. Gordon's model had the somewhat doubtful honour of providing the most sensational spectacle yet seen at Ibrox. After flying well in large circles at a tremendous altitude it commenced gliding down towards the railway, just as the fast train from the coast was approaching. The model struck one of the carriage windows and, in falling, was sucked underneath the train. Every single part of the model, with the exception of the small rudder, was absolutely demolished, the fuselage being entirely stripped and run over by the wheels. It is interesting to note that the backbone of this fuselage was part of a model which last summer landed on the top of a passing train and was held fast by the lamp top on the carriage roof. It was blown off, however, when passing under the bridge. The competition for aggregate is to be held to-day (17th) and not 24th, as stated in last week's FLIGHT, at Barrhead Aerodrome, at 3 p.m.

Next lecture will be given by Mr. R. W. Philpott, pilot to the Scottish Aviation Co., on February 23rd, in the Institute, Elmbank Crescent, Glasgow. A large attendance is requested. Members please note that the smoking concert will be held on February 29th, in the Lansdowne Restaurant, Hope Street, at 8 o'clock p.m. As a great deal depends upon the success of this event the committee *earnestly request that every member will help all he can to sell tickets* and secure talent. Flying at Ibrox next Saturday, also kite flying. A hydro-aero meeting will be held shortly.

Worcester Model Aero Club (Sec., S. A. SEARS, VICTORIA INSTITUTE, WORCESTER).

AN indoor meeting was held on Saturday in consequence of the bad state of the ground. It was decided to award two classes of certificates, one for 300 yards and 30 secs. and the other for quarter-mile and 60 secs. The members joined in discussing model efficiency.

The next meeting will be on the club ground, Pitchcroft, to-day (Saturday) at 3 p.m., when the efficiency experiments will be conducted.

Yorkshire Ae.C. (Model Section) (5A, HULLAND ST., LEEDS).

THE weather being favourable on Saturday last, a good meeting was held on Woodhouse Moor. The distance competition resulted as follows:—1st, J. Whitaker, 457 ft.; 2nd, Roberts, 415 ft.; 3rd, Thornton, 380 ft. The actual distances flown exceeded these figures, but nearly every model was out for circling. After competition, H. Braithwaite obtained an absolutely straight flight of 750 ft., and J. Whitaker did 600 ft., at dusk. Judge, Mr. Macpherson (Y. Ae. C.) Meet to-day (Saturday, 17th), Carlton Hill Aerodrome, usual time.

SCHOOL AERO CLUBS.

Holloway County Secondary School Aero-Models Club (HILLDROP ROAD, CAMDEN ROAD, N.

THE above school aero club has been formed. The inaugural meeting was held on February 5th, when it was announced that Mr. Kahn, M.A., the headmaster, had consented to act as president, vice-presidents being found in members of the staff, whilst Mr. H. P. Lunn, B.Sc., has become treasurer. Mr. H. P. Bushell, the captain of the school, is the chairman. Messrs. F. Butler, E. R. Jones and E. G. Silverton were elected to the committee to act with the officers, *ex officio*. The club, in order to encourage the science of aviation, is arranging an attractive course of lectures on the "Principles of Flight," to be held fortnightly, whilst the club will encourage the members to discuss their experiments at the meetings of the society. Already a good membership has accrued which shows every sign of rapidly increasing in numbers. The next meeting will be held on Monday, February 19th, the subject to be announced later.

Southgate County School Ae.C. (FOX LANE, PALMER'S GREEN, N.).

A COMPETITION for distance will be held on March 2nd at 3 o'clock, at Powy's Lane, Palmer's Green, N. First prize: model materials to value of 2*s.* 6*d.*; no entrance fees. Any flight made before 5 o'clock will be eligible. Members are requested to attend with models, as Mr. Paull, the club's president, hopes to secure a photograph of the club. All persons interested are cordially invited.

The secretary, E. R. Brown, would be pleased to come into touch with other school aero clubs. Address, "Homesdale," 84, Bowes Road, Palmer's Green, N.

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A National Movement in France.

AT a great meeting held at the Sorbonne under the auspices of the Association Générale Aéronautique on the 11th inst., presided over by M. Clemenceau, the movement for the presentation of aeroplanes to the French Army by the various departments of France, was advanced considerably, and it was decided to form a *Comité Nationale de la Aviation Militaire*. At the outset of the meeting enthusiasm was carried to a high pitch by the reading of a letter from M. André Michelin, offering a sum of 100,000 francs for providing scholarships for military aviators and prizes to encourage their zeal and reward their efforts. It was also announced that the Municipal Councillors present should demand a vote of 50,000 francs from the Paris Council, while a number of aeroplanes, hangars and flying grounds were offered as follows:—M. Martin, a ground of four hectares with hangar at Beaucaire; the Société Aéronautique des Picardie, 5,000 francs; the A. G. Aéronautique, one monoplane, M. Deutsche (de la Meurthe) one monoplane; M. J. Balsan, a hangar at Chateaudun and a hangar for four machines and a house for twenty mechanics at Pau; the forty-third section at Orleans, one aeroplane; the Cher Department, one aeroplane; the Charent Department, an aerodrome of 100 hectares; Poiteres, two hangars at Biard Camp, and one aeroplane. Capt. Bellenger, Senator Reymond, M. Millevoye, and M. Gabriel Bonvalot all made speeches dealing with the use and advantages of aeroplanes, and at the end of the meeting M. Clemenceau appealed to the patriotism of the great audience to help the work of the committee. A collection produced 2,450 francs towards the general fund.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

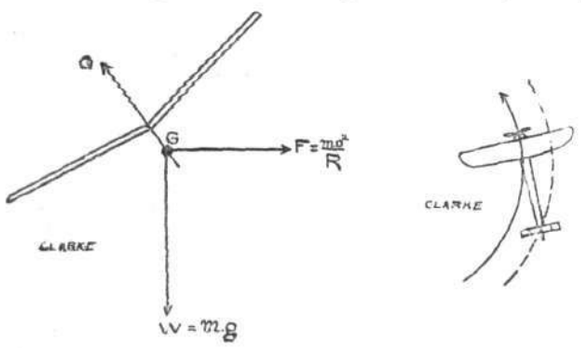
Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Points for Discussion.

[1490] In the issue of February 3rd your correspondent, John Clive [1482], states a few facts with a view to their discussion. While in the main agreeing with most of his "points," there are some I should like to discuss.

(i) "If the wings of an aeroplane have a pronounced inverted dihedral angle, the machine will steer contrarily to the rudder." This would, I agree, be the case if the distance of the rudder from the centre of lateral resistance were small compared to the span, for the effect of the rudder is two-fold, viz., when set to turn, say, to the left, it turns the head of the machine to the left, but at the same time tends to slide the machine bodily to the right; the first motion tends to bank the machine in the correct direction, the second in the wrong direction; and as to which motion will prevail depends on the comparative values of the lengths above-mentioned. Even if the banking is in the wrong direction, I do not see that the higher wing will "swing round," but on the other hand the machine will be veering to the left while skidding to the right, a process soon leading to trouble. In practice the inverted dihedral angle would never be more than just sufficient to make the machine "neutral" to side gusts or motions.

(ii) "A lifting-tail machine has to dive in turning." Your correspondent puts this down to loss of efficiency of the tail due to travelling diagonally through the air, but the main surfaces are tilted just as much and, moreover, have a greater incidence angle than the tail, so that one would, if anything, expect them to have the greater loss of efficiency due to obliquity. But is there any loss of efficiency due to this cause? I think not if the banking is correct, for the result of turning is to introduce a centrifugal force, F, which combined with W, has to be balanced by the resultant pressure, Q, on the planes. If, then, we view the machine so that Q is vertical, we see that the conditions are the same (except in the matter of warping), as if the machine were on an even keel and its weight had been increased from W to Q. To meet this extra loading the angle of incidence of the planes, or else the speed, must be increased, the latter is generally the simpler and more efficient. To do this the engine must be further "opened out," or if there is not a sufficient surplus of power for this purpose, gravity must be pressed into service by means of diving. Moreover, owing to the necessity of warping,



the efficiency of the main planes is reduced, also generally the tail moves on a larger circle than the centre of the main wings, both of which assist the necessity by giving the machine a tendency to dive. These considerations apply no more to the lifting-tail type of machine than to any other, but, then, is it a fact that the lifting-tail type of machine with a superfluity of power is yet obliged to dive when turning? It would be interesting to have the opinion of various pilots on this point.

Below I give a small table of the values of $\frac{Q}{W}$, *i.e.*, the comparative increase of loading; also the comparative increases of speed and power for various radii and flight speeds, on the assumption that the extra load is taken by "opening up" the engine. The alternative necessary amount of dive is also given.

I will only encroach upon your valuable space to make one further remark, viz., that as to point (v), I do not agree that "superposed planes should be staggered forwards from top to bottom"; but, on the other hand, maintain that the upper ones should be in advance of the lower, the reason being, in my opinion, that in this case (to express it somewhat unscientifically) the surfaces "fit" into the stream-lines better, *i.e.*, the line joining corresponding points on the surfaces (such as the leading edges) are more nearly radial to the surfaces and the intermediate stream-lines.

What little experiment I have done with model gliders seems to bear this out. It was also one of the slight variations I introduced into Mr. Ogilvie's Wright glider, and I am sure, added to its efficiency. See also Mr. Sellers' experiments in America with very small power. Messrs. Farman and Goupy, I feel sure, also recognise this.

Table referred to:—

Normal Flight Speed.	Radius of circle. 200 ft. $\frac{Q}{W}$	$\frac{V'}{V}$	$\frac{P'}{P}$	Dive.	300 ft. $\frac{Q}{W}$	$\frac{V'}{V}$	$\frac{P'}{P}$	Dive.	400 ft. $\frac{Q}{W}$	$\frac{V'}{V}$	$\frac{P'}{P}$	Dive.
m.p.h.												
40	1·3	1·1	1·4	1 in 28	1·1	1·05	1·2	1 in 62	1·1	1·05	1·15	1 in 110
50	1·7	1·3	2·2	1 ,, 11	1·3	1·15	1·5	1 ,, 26	1·2	1·1	1·3	1 ,, 47
60	2·5	1·6	4·0	1 ,, 5	1·6	1·3	2·2	1 ,, 12	1·4	1·2	1·6	1 ,, 22
70	3·7	1·9	7·0	1 ,, 3	2·2	1·5	3·3	1 ,, 7	1·7	1·3	2·2	1 ,, 12

For example, in the most extreme case in this table, a machine whose normal speed was 70 m.p.h., in order to travel round a circle of 400 ft. diam. (200 ft. rad.), would have to travel very nearly twice (133 m.p.h.) as fast, and would use seven times its normal horse-power (as measured by thrust and speed), or else it would have to dive at an angle of 1 in 3 (19°). And this is without taking into account the loss of efficiency due to warping.

Kingston. ——— T. W. K. CLARKE.

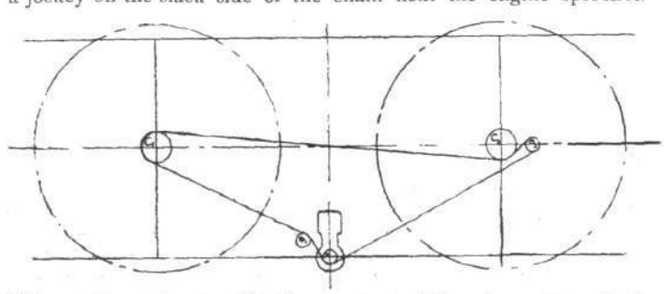
Chain-Driven Propellers.

[1491] From the point of view of the chain alone, the propeller drive is not ideal owing to the excessively high chain-speed usually developed, *i.e.*, often 2,000 ft. per minute, which is about double that normally allowed for the same chain in ordinary engineering practice. At the same time, if the chain is made of specially selected materials, and an extra strong chain of relatively short pitch used, the drive is quite permissible, though very long life must not be expected, and great attention should be paid to lubrication.

Now I believe that the advantages of geared-down propellers are generally recognised, the ordinary engine speed being too high for their best efficiency; in fact, one solution of flight with comparatively low powers appears to lie in the use of large geared-down propellers of coarse pitch. It is further generally admitted to be desirable to use two propellers revolving in opposite directions, thus balancing the torque. Hitherto, however, the great objection to this has been the use of the crossed chain, which is undoubtedly bad practice. A chain was never meant to be crossed, and when it has to be forced to cross by dragging through steel tubes, the wear and tear is enormous. Consequently, the crossed chain is generally liable to break, and the consequence of one chain breaking while the other goes on driving would be serious.

In view of these facts, and of the great desirability of obtaining a satisfactory chain drive for aeroplanes, I have designed an arrangement by which two propellers can be driven in opposite directions by a single chain without the necessity of crossing. The sketch appended shows the arrangement. If desired, two chains could, of course, be used, with the same arrangement for the reverse drive on one side; but, of course, the advantage of a single chain is that if anything goes wrong both propellers stop working together.

I may say that this method of driving from the back of the roller type of chain is perfectly sound in theory and practice, the only proviso being that there must be a minimum of at least three wheel teeth in gear with the chain at once. For this reason I have added a jockey on the slack side of the chain next the engine sprocket.



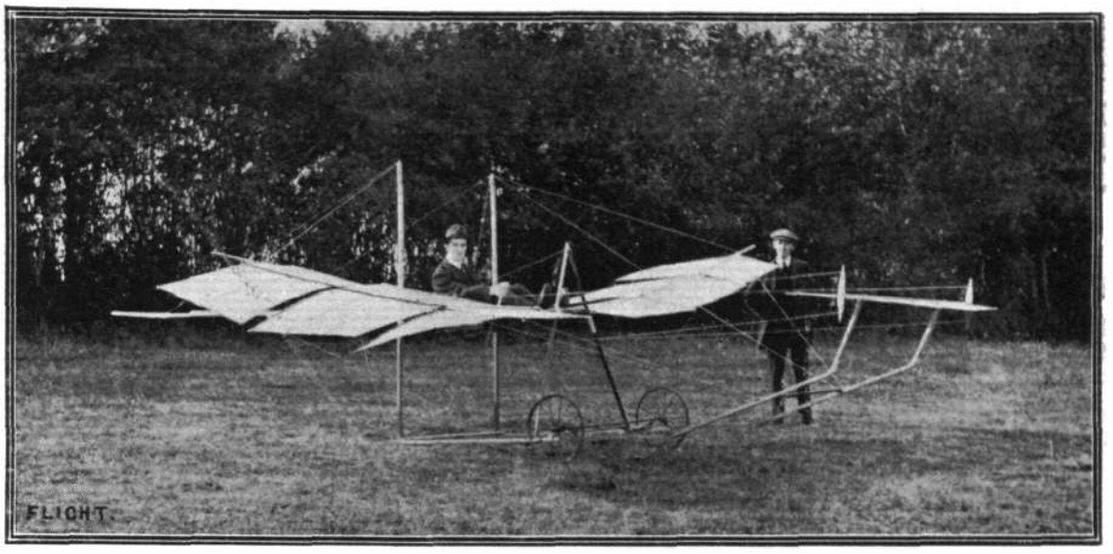
This need not be considered as extra weight, since only a single driving sprocket is required. The weight of the outer jockey is, of course, additional, and perhaps should be balanced.

With this method of driving, the long centre distance neces-

sary to allow a chain to be crossed is obviated—in fact, the propellers may be brought as close together as the construction of the machine will permit. If, however, the centre distance is left long, it will probably be desirable to run a part of the long stretch of chain between the two propellers through a light tube in order to steady it. Lastly, it is highly desirable that either the outside jockey or the one near the engine should be made adjustable to take up the slack in the chain when necessary.

DOUGLAS GRAHAM.

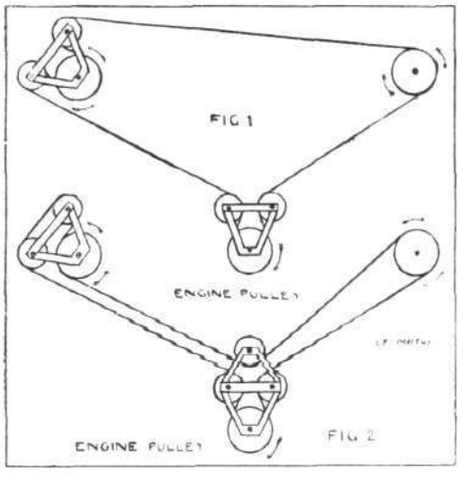
Manchester.



Mr. R. Eggleton in the seat of his No. 2 glider, Mr. J. Moran standing by.

Single Chain Transmission.

[1492] Referring to the Savary drive shown in your issue of January 13th, perhaps your readers may be interested in the accompanying sketch of a drive which was tried on the biplane constructed by our Society last year, and which I think is a better device. You will see that the chain does not have to cross at all, an important point, as it ensures a straight drive. The idle wheels are in such a position that they can be pivoted on two points of a triangle, of which the third point is occupied by the working pulley. I should like a criticism of this device, which failed with us, largely, I think, because we had no surplus power, and the idle wheels gave too much friction. I should mention that we used a belt, but I think a chain would give better results. Unfortunately a chain costs about ten times what you can buy a belt for, which sufficiently accounts for our using the latter. The second sketch shows a method of doing without the horizontal part of the drive, which might be awkward on some machines.



W. LE MAÎTRE,

Hon. Sec. Aeroplane Building and Flying Society.

Sutherland Avenue.

Home Made Gliders.

[1493] Normally engaged as an apprentice in the London and South-Western carriage works at Eastleigh, nevertheless I have in my spare time been able to do a fair amount of work on gliders during last year, and the accompanying photographs may perhaps interest other readers of FLIGHT. The span of my latest machine is 28 ft., and the length overall 24 ft. Balance is obtained by ailerons coupled up to pedals, while a hand wheel operates the rudder and the elevator. The experimental work so far has been entirely obtained by towing the glider until it rises to a sufficient height. My previous model gave me some excellent sport over the 300 yards stretch that I have available. A club is being formed which I hope will do good work, and the country hereabouts is also an excellent flying ground for full-sized machines.

24, Cranbury Road, Eastleigh, Hants. R. EGGLETON.

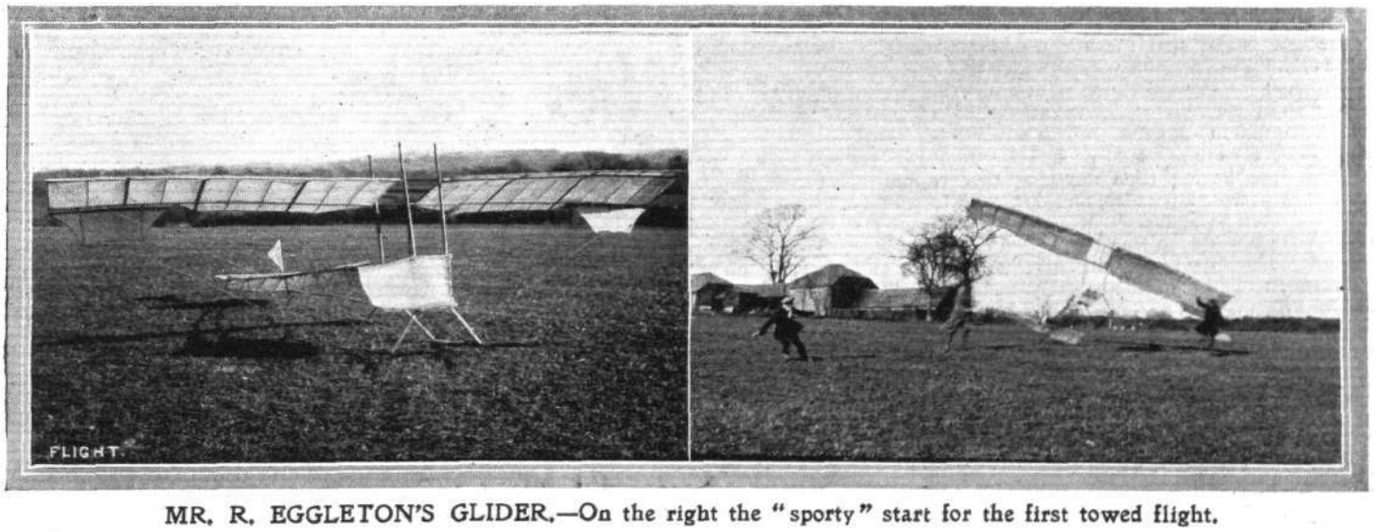
MODELS.

Scientific Model Encouragement.

[1494] It should be the aim of all model aviators to construct machines which are of practical utility. In furtherance of this idea we have decided to award prizes for efficiency; the method of allotting marks being to calculate a number according to the formula:—

$$\text{Efficiency} = \frac{\text{weight of machine} \times \text{time of flight}}{\text{area of planes} \times \text{weight of elastic}}.$$

This, you will notice, introduces the two factors, loading and power. I maintain that this should be the correct method of ascertaining model efficiency, because the loading must essentially be of first



MR. R. EGGLETON'S GLIDER.—On the right the "sporty" start for the first towed flight.

importance in the design of any machine, and the power required must be reduced to a minimum for the most economical machine.

We obtain loading by dividing weight of model by area of planes, and power by dividing weight of elastic by duration of flight.

There is another formula which I have seen recently, viz. :—

$$\text{Efficiency} = \frac{\text{weight of machine} \times \text{distance}}{\text{weight of elastic}}.$$

This introduces the force required to propel the model, together with weight propelled, and gives the highest efficiency for the greatest weight and least driving force, whereas the first formula gives the best value for greatest loading and least power.

Another point in favour of the first formula is that measurements are scientific and do not suffer by local or accidental conditions, whilst the second may be increased or decreased by several conditions out of the competitor's control.

The machine flying against the wind is penalised, while one flying with the wind obtains false honours. A sudden gust may alter the direction and thus decrease the efficiency by reducing the distance (measured in a straight line). Swerving will, in the same manner, detract from the result; but should this be thus counted as lack of efficiency? I think not, because direction would be under the perfect control of the pilot in a full-size machine.

I should be glad of criticism or advice in this matter.

STANLEY A. SEARS (Hon. Sec. Worcester M.Ae.C.).

Victoria Institute, Worcester.

The "Gnat" Model.

[1495] To the description of my "Gnat" Tractor screw model in your issue of December 30th, and the remarks on same made by Mr. V. E. Johnson, may I be permitted to make the following reply through the agency of your correspondence columns.

In the first place, in all my experiments with either single or twin screw tractor type models, the models, when not fitted with a fin have always given the same results, despite the fact that they will glide well whether fitted with a fin or not. I will do my best to describe this action. When wound up and released the model travels about five yards quite nicely, then suddenly starts to go upward, turn a very small circle and dive downwards, nose first, without the slightest attempt to regain the horizontal, despite all kinds of stabilising angles on both main plane and tail.

Of course, I do not go so far as to say that this action will apply to any model of this type, I merely state what has happened to my models, notwithstanding the fact that when making a twin tractor I am always most careful to have exactly the same weight of rubber to each screw, giving each the same number of turns, and as I always use carved wood screws the pitch is the same in each screw, so that the action should be exactly balanced; yet with all these precautions I have not succeeded in obtaining a flight until a fin has been added, even if it be only of the most primitive description. For example, when making my first twin-tractor I took it for granted that I should not need a fin, owing to the action being balanced I therefore did not fit one.

I wound this model up and released it, and to my very great surprise found this same action as applied to the single screw machines. Again testing this thoroughly I decided to put on a fin of some sort, and having nothing more suitable than a thin postcard I fitted this underneath the tail plane, and stiffened the front edge with a piece of 20 s.w.g. soft iron wire. After adding this very primitive fin, the very first attempt at flight resulted in a flight of about 50 yards. Can Mr. Johnson explain this?

Now, supposing that we were to convert this single screw into a twin, as proposed by Mr. Johnson, I have very great doubts as to "the result being that the length of flight would be considerably increased." I am afraid it will take time and a lot more co-operative experiment before we find out what really happens to this type of model and the cure for it; up to the present I have not yet succeeded in getting more than 50 yards with a twin-screw tractor monoplane, and I have certainly not touched anything unreasonable, in my designs, not having tried anything that is not reasonable and generally accepted practice, and I am quite sure that the screws have not been at fault.

I have a model (constructed since sending the description of my No. 8 model to you), 30 ins. overall length, 22 in. span, 6 in. diameter, 12 in. pitch, tractor screw, weight exactly 3 ozs. Number of turns obtainable 500 (length of rubber drive is only 20 ins.) This model has repeatedly flown from 120 to 130 yards. Now for an analysis.

Tractor, 12 in. pitch; highest number of turns 500. The greatest distance this model could fly is obviously 500 ft. Now, the model flies 120 to 130 yards, or 360 to 390 ft., meaning a loss for slip of propellers and resistance of model of only 110 to 140 ft., 75 per cent. efficiency, which I think is quite on a par with the full-sized machine. I would like to say that only 3 yards 12 in. of $\frac{3}{16}$ strip rubber was used to take this 3-oz. model its 130 yards. I think this is as good as any elevator leading and carved propeller combination can do; my reason for stipulating a carved propeller is because you cannot be absolutely certain what is the pitch of a bent wood or makeshift propeller, owing to the huge camber given to it in winding.

A great advantage that the twin propeller elevator leading model has over the single-screw machine of either type, is the enormous pitch possible to put on the propellers with impunity, sometimes reaching as much as 34 in. pitch on a 2 ft. 9 in. frame, while to even approach this high pitch would be useless without an enormous span on a single screw machine.

Finally, I will mention that the greatest distance accomplished with the No. 8 model described in your issue of December 30th was 100 yards not 150. As to speed, this was *estimated* by myself to be about 18-20 m.p.h.

The run taken before rising was about four feet against a fairly strong wind off the grass on Blackheath; I do not think the model would rise in a calm as the wheels are too far in front of the c.g.

Brandon Street, S.E. J. H. DOLLITTLE.

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"The Aeroplane in War."

SUCH is the title of a new book in which Mr. Claude Grahame-White and Mr. Harry Harper have collaborated, and as may be gathered deals with the use of Military aeroplanes. It will shortly be published by Mr. T. Werner Lawrie.

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IMPORTS AND EXPORTS, 1911-12.

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910):—

	Imports.		Exports.		Re-Exportation.	
	1911.	1912.	1911.	1912.	1911.	1912.
	£	£	£	£	£	£
January ...	1,196	619	1,088	2,412	Nil	Nil

Aeronautical Patents Published.

Applied for in 1911.

Published February 15th, 1912.

2,194. J. W. BUCK. Flying machines.
4,165. G. MEES. Regulating speed and altitude of flying machines with gyroscopically-acting stabilising propellers.
5,070. G. MEES. Differential-control of twin propellers.
18,311. M. REYMOND. Aerial propelling devices.
19,354. T. JAMIESON. Propeller for driving aerial torpedoes.
23,516. L. B. HOLLAND. Aeroplanes.
27,160. R. J. ISAACSON. Mounting aerial propellers.

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